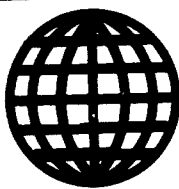


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Environmental Issues

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Environmental Issues

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23 June 1992

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Nonaligned Movement Urged To Follow 'Realistic' Priorities

*BK1405044892 Hong Kong AFP in English 0359 GMT
14 May 92*

[Text] Nusa Dua, Indonesia, May 14 (AFP)—Indonesian President Suharto called on the Nonaligned Movement (NAM) Thursday to revise its priorities realistically in order to face the rapid political and economic changes in the international situation.

"In facing both the opportunities and challenges subsumed in the evolving international situation, our movement will have to make a clear-sighted and realistic assessment of their implications and to adapt our policies and agenda accordingly," he said.

He was opening a two-day ministerial meeting of the movement's coordinating bureau, attended by foreign ministers or their representatives of its 103 member states which is drawing up an agenda for the heads of state summit in Jakarta in September.

Suharto said that the 31-year-old movement should engage in realistic reordering of its priorities, to pursue its goals and safeguard the fundamental interests of member states.

Noting that the NAM's basic principles and objectives "have lost nothing of their validity and relevance," Suharto said the movement should continue to strive for a new international order where peaceful coexistence, democratization, cooperation and equitably shared development prevailed.

He said if the aim was to turn into a tangible reality, then the United Nations constituted the most effective instrument. So he urged NAM members to help strengthen, revitalize, and democratize the world body.

Suharto also stressed the importance of South-South economic cooperation based on the concept of self-reliance to open up "new avenues of growth and reduce undue dependence vis-a-vis the North."

Adverse development in the world economic situation has "further compounded the difficulties confronting the developing countries," Suharto said.

Although better off than in the 1980s, developing countries were still saddled by debilitating debt burdens, strapped for development finance, denied fair access to the market of developed countries, and frustrated by a decline in commodity export prices, he said.

The movement, Suharto said, cannot afford to be passive on new global concerns as in the environment, the promotion of human rights, democracy, and "so-called good governance."

He urged NAM to formulate common positions and approaches, in view of the "growing tendency among

developed countries to link these issues as political conditionalities to the sphere of development cooperation."

The NAM ministerial meeting is expected to set up the agenda for the group's upcoming summit in Jakarta in September.

Indonesia, who will officially take over NAM chairmanship from Yugoslavia in September, has already held the de-facto leadership of the movement following the severe internal problems in Yugoslavia.

Meanwhile the new republic of Croatia, formerly part of the Yugoslav Federation, one of NAM's founder members, has formally asked to be given observer status within the movement.

Foreign Minister Zvonimir Separovic said in a letter to the coordinating bureau this would allow Croatia to make a constructive contribution to the movement.

Separovic told AFP that the delegation which claims to represent Yugoslavia at the meeting, "in fact only represents Serbia which is acting so aggressively in Bosnia Hercegovina."

He said Yugoslavia no longer existed, and all the states emerging from the former republics were the federation's successors.

Middle East Conference Views Environmental Cooperation

First Day's Session 'Identifies Common Ground'
*OW1805124992 Tokyo KYODO in English 1121 GMT
18 May 92*

[Text] Tokyo, May 18 (KYODO)—Participants at a multilateral conference which opened here Monday on the Middle East agreed on the need for cooperation in solving the region's pressing environmental problems.

Japanese Foreign Ministry officials characterized the Tokyo working group meeting on the environment as "friendly and substantial." The two-day meeting is part of the overall Middle East peace process.

Ministry officials said Japanese diplomats managed to head off excessive bickering between Israeli and Palestinian delegates during the meeting at a Tokyo hotel.

Israeli delegation leader Uri Marinov, director general of the Ministry of Environment, told reporters that the first such meeting between Israeli and Arab states on environmental problems was a "historic, landmark conference."

"We were very encouraged in the first day of the meeting to hear some very positive suggestions and remarks by several countries," Marinov said, adding that recommendations aired Monday are expected to be discussed in greater detail Tuesday.

"We also were encouraged to see the great agreement among all participants that only cooperation of all parties could achieve results," he said.

Moshe Raviv, director general for information in the Israel Foreign Ministry, said, "in the statements today, already we could identify some common ground."

"Today was a day of statements and tomorrow we expect some practical movement," he added.

Also among the 37 delegations were those from Japan, the United States, Russia, China, India, and European Community members. Syria and Lebanon are boycotting all multilateral talks, saying bilateral negotiations have precedence.

Japanese officials said Palestinians in the joint Palestinian/Jordanian delegation drew Israel's ire when they claimed to represent all displaced Palestinians, as well as those in East Jerusalem.

The Palestinians also complained about being lumped with Jordanians and said that to tackle environmental problems, Israeli occupation of their lands must end first.

Officials said Japan and the United States persuaded the Israeli delegation not to make a major issue of the remarks so that the meeting could proceed smoothly.

According to Raviv, "they referred to issues which are completely outside the purview of this environmental group, which belong to the bilateral talks."

Under a formula designed to entice Israel to the negotiating table, Palestinian representatives from the occupied West Bank and Gaza, but not East Jerusalem and the diaspora, are included in the joint delegation with Jordan.

They are also not supposed to be representing the Palestine Liberation Organization (PLO), with which Israel refuses to negotiate.

But senior PLO official Abu Ala, who serves as an advisor on economic and financial affairs to PLO President Yasir 'Arafat, is serving as their "supervisor" outside the conference site.

The Tokyo meeting, aimed at identifying environmental problems and seeking potential regional cooperation, is Japan's first high-profile political contribution to the Middle East peace process.

Sources said the Russian delegation proposed a center for environmental information in the Middle East.

Marinov said Israel suggested the setting up of a "hot-line" that would allow direct communication between Israel and other countries of the region in environmental emergencies.

He said Israel also advocated consultations on contingency planning, cooperative training exercises, and

emergency procedures to cope with oil spills in the Gulf of Aqaba and in the Eastern Mediterranean Sea.

Israel further called on its counterparts to establish an air pollution monitoring network based on models in other regions, Marinov said.

Marinov said subgroups could be formed to discuss technical details of the proposals, adding that Japan and other governments have already indicated their readiness to host such meetings.

Sources said Egypt proposed a declaration on main concepts and basic principles for regional environmental cooperation.

Egypt called for regional environmental impact assessment studies, as well as a ban on military activities that adversely affect ecological systems.

It also called for secure management and disposal of radioactive waste, early notification of nuclear accidents, and a ban on "the transfer of all activities detrimental to the environment of other countries of the region."

The working group is one of five created at last January's foreign ministerial conference in Moscow on issues concerning the Middle East. The meetings are being held in different cities around the world.

The four other working groups concern arms control, economic development, water resources, and refugees.

Palestinian Delegate Accuses Israel of Destroying Environment

OW1805112192 Tokyo KYODO in English 0938 GMT 18 May 92

[Text] Tokyo, May 18 (KYODO)—The head of a Palestinian delegation said in Tokyo Monday that Israel is destroying the environment and controlling the natural resources in its occupied territory.

"The environmental situation in the occupied Palestinian territories is threatened by Israeli laws and practices," Jad Eijas Ishaq [name as received] said after a morning session of the multilateral Middle East conference in Tokyo.

Ishaq is leading the six-member Palestinian delegation of experts on environmental issues.

Japan is hosting the two-day conference on the environment in the Middle East which 120 officials from 37 countries are attending. During Monday's plenary session, Japan led discussions on the results of an environmental fact-finding mission it sent to the region in February and March.

"Our positive and active participation in the meeting reflects the commitment of the Palestinian people and their leadership, the PLO, to the peace process in both its bilateral and multilateral tracks," Ishaq said.

Citing a recent report by the Palestinian Center for Human Rights, Ishak said between December 1978 and July 1991 the Israeli army and Jewish settlers uprooted more than 120,000 trees in the occupied territories.

"Since 1967, Israel has been confiscating Palestinian land in the occupied territory," he said. "We now believe that 60 percent of the West Bank is confiscated or under control."

He also said that in the Israeli-occupied Gaza Strip, 40 percent of the land is confiscated or under control.

"Israel is taking about 80 percent of the water resources in the occupied territory," he said.

One of other delegates, Dr. Jamal Mohamed Deeb Safi [name as received], referred to the water issue in the Gaza Strip, saying, "we are not only suffering from shortage of water but also polluted water."

Palestinians living in the Gaza Strip have 39 sewage disposal facilities but do not have a central sewage system, said the director of Environmental Protection Center in the Gaza Strip.

He said a major problem is that dirty water is running into the Mediterranean Sea.

In the occupied territories Israel is using some toxic insecticides which are banned in other countries, Safi said.

Israeli Environment Minister Rejects Palestinian Claim

OW1805145292 Tokyo KYODO in English 1321 GMT 18 May 92

[Text] Tokyo, May 18 (KYODO)—Israeli Environment Minister Uri Marinov on Monday rejected Palestinian claims that Israel is destroying the environment in the occupied West Bank and Gaza Strip and said the environment has improved since the territories were taken over in 1967.

"The environment of this region that we found in 1967 was in quite bad shape," Marinov said in a meeting with reporters after a day of multilateral working group talks on environmental problems in the Middle East.

"What has happened since 1967 is an improvement of the environment in many, many areas...so to blame us for causing damage to the natural resources is completely a false statement," he said.

Marinov was responding to charges made to reporters earlier in the day by Jad Ishak [name as received], leader of the Palestinians, in the joint Palestinian-Jordanian delegation to the multilateral talks.

Ishak said that some 60 percent of the West Bank and 40 percent of the Gaza Strip have been confiscated by or put under control of Israel, and that 80 percent of the water resources in the two territories have been taken.

Citing a recent report by the Palestinian Center for Human Rights, Ishak said between December 1978 and July 1991 the Israeli army and Jewish settlers uprooted more than 120,000 trees in the occupied territories.

Marinov acknowledged that during war operations some trees were uprooted, "but to say something like that would be completely incorrect."

"We feel that planting trees is essential to our survival in the country," he said, adding that when Jews began returning to their once forest-covered homeland in the early part of this century "we found it completely denuded of trees and covered with swamps and erosion."

Marinov said the Israeli Government's policy is "to treat environmental issues in the (occupied) territories in exactly the same way as we treat our own problems."

Earlier, Palestinian delegate Dr. Jamal Mohamed Deeb Safim [name as received] had said Palestinians in the occupied territories are suffering from shortages of water and water pollution arising partly from an absence of essential facilities.

Marinov said Israelis have similar sewage and water shortage problems. "This is a common problem and we do not discriminate in any one way or another against the territories," he said.

Chinese Delegate Urges Global Cooperation

OW1805162592 Beijing XINHUA in English 1545 GMT 18 May 92

[Text] Tokyo, May 18 (XINHUA)—Middle East environmental problems could only be solved through global cooperation, a Chinese representative said today at a multilateral conference on the region opening here.

In a presentation to the two-day multilateral working group meeting, Liu Zhentang, head of the Chinese delegation, said finding solutions to the environmental problems was an important and urgent task confronting countries in the region.

"Like other regions in the world, the Middle East also faces such problems as air pollution, soil erosion, degradation and desertification," Liu, a Chinese Foreign Ministry official said.

"Solving the region's environmental problems calls for global cooperation, the concerted efforts and fruitful cooperation of all countries in the region," he said.

Calling for an early settlement of the Middle East question centered around the question of Palestine, Liu said, "realizing a just and enduring peace in the region is a prerequisite and sine qua non for the region's economic development and environmental protection."

Middle East countries were in widely different phases of development, he added. Hence, China felt different economic development levels and capacities should be

taken into full consideration when formulating an environmental protection strategy.

Countries in the region should also consider the interests of neighboring states, he said.

The Chinese Government had long attached great importance to environmental protection and taken an active part in international cooperation in this field, he added.

China was ready to work together with other participating countries for Middle East environmental protection and make its own contribution toward this end, he said.

The working group meeting is one of five created in the overall Middle East peace process. The four other groups are to focus on arms control, economic development, water resources and refugees.

Some 120 representatives from 37 countries including Jordan, Israel, the United States, Russia, China and Japan are attending the conference.

Conference Seen Enhancing Arab-Israeli Confidence

OW1905141292 Tokyo KYODO in English 1357 GMT 19 May 92

[Text] Tokyo, May 19 (KYODO)—An international conference on the environment in the Middle East ended Tuesday with some participants calling it a success in boosting Arab-Israeli confidence.

Pronouncing the success of the two-day meeting in Tokyo of the working group on the environment, Jordanian delegation leader Anis Mouashor said it helped facilitate mutual confidence.

Anis Mouashor also said there was "a general agreement among participants on different environmental issues," which he said "laid a base for proceeding with future meetings."

Japanese delegation members said it was provisionally agreed that the next meeting should take place in The Hague, the Netherlands, sometime in early fall.

European Community representative Ana Gomes of Portugal said the mere fact that Arabs and Israelis sat at the same table made the meeting a confidence-building success.

"They not only sat...they agreed to try to identify areas for cooperation," he said, adding he could "clearly see a consensus emerging in identifying the main problems."

Palestinian representatives, opposed moves during the talks that might outstrip bilateral peace negotiations, were not immediately available for comment.

Israeli Environment Minister Uri Marinov said his country was "happy with the results" of what he called

"frank and even friendly discussions," adding they were particularly productive compared with other multilateral talks held in various world cities.

The working group on the environment is one of five groups. The others cover arms control, economic development, water resources and refugees.

Also among the 37 delegations attending the talks were those from Egypt and other Arab states, the U.S., Russia, China, and India.

Marinov said that while Israel regretted the Palestinian team's raising of political issues which fall outside the agenda of the meeting, it was encouraged by "very constructive statements made by our neighbors, including Jordan."

He said there is a basic difference in approaches, with Israel saying confidence-building will lead to peace. Palestinians insisted an Israeli withdrawal from the West Bank and Gaza is needed before there can be cooperation on the environment.

Japanese officials said they were relieved to have pulled off the meeting, Japan's most high-profile initiative yet in the Middle East peace process, in the face of the sporadic bickering between Israelis and Palestinians.

Japanese and U.S. intervention prevented a scuttling of the talks Monday after Palestinians drew Israeli ire by acknowledging the leadership of the Palestinian Liberation Organization (PLO) and claiming to represent all Palestinians.

Under a formula designed by the U.S. and Russia to entice Israel to the negotiating table, Palestinian representatives from the Occupied West Bank and Gaza, but not East Jerusalem and the Diaspora, are allowed to participate in the joint delegation with Jordan.

The meeting ended with a concluding assessment by the Japanese delegation, which officials said was preceded by over five hours of unsuccessful efforts to work out a statement to be issued in the name of all participants.

Israel balked at a Palestinian demand for an explicit reference to the need for Israeli withdrawal from the Occupied West Bank and Gaza Strip if environmental problems are to be addressed.

Neither accepted a compromise proposal by Japan, which eventually appeared in its assessment, that some environmental issues in the region "may not be adequately addressed without due respect to the underlying political and socio-economic conditions."

Officials said the reference was not only to the occupied territories but also reflected a need to consider the effect on the environment of such factors as overpopulation, refugee flows, and economic deterioration.

Informed sources said that among the concrete recommendations aired at the meeting was a Russian proposal for establishment of a center for environmental information in the Middle East.

Israel proposed direct communication links with Arab neighbors for use in environmental emergencies, as well as consultations on emergency procedures to respond to oil spills in surrounding waters.

Egypt proposed a declaration of basic principles for regional environmental cooperation, secure management and disposal of radioactive waste, and a ban on "the transfer of all activities detrimental to the environment of other countries of the region."

Japan proposed environmental impact assessments, manpower training programs in environmental management, public awareness campaigns and a sea water-quality monitoring plan.

Beijing Hosts World Environment, Development Conference

*OW1805154492 Beijing XINHUA in English
1402 GMT 18 May 92*

[Text] Beijing, May 18 (XINHUA)—More than 90 officials and experts from China's Ministry of Finance and State Environmental Protection Bureau attended a conference on the "World Development Report 1992" sponsored today in Beijing by the World Bank.

The conference was held just prior to the upcoming United Nations meeting on the environment and development, a main theme of the World Bank report, which will be held in Brazil in June this year.

Chi Haibin, vice minister of finance, told conferees that the environment and development are significant to all countries, both developed and developing. He said that economic development is the basis for environmental protection, and without the economic development there will not be enough funds for the environmental protection effort.

Chi stressed that as part of the effort to enhance global environmental protection it is important to carry out a series of appropriate environmental protection policies, as well as to have adequate funding to develop corresponding technology.

He said that in view of the fact that global environmental pollution was caused mainly by long-term industrial development in developed countries, they then should be

expected to bear the main responsibility for protecting the environment. He added that it is also their responsibility to grant preferential loans and transfer environmental protection technology to developing countries.

China has put forth great efforts in its economic development effort during the past 10 years, and, the country has also taken active measures to enhance environmental protection.

Statistics show that China allocated over 17 billion yuan towards the environment during the Sixth Five-Year Plan period (1981-1985), and, the amount rose to 47.7 billion yuan during the Seventh Five-Year Plan period (1986-1990), accounting for 0.7 percent of the country's gross national product.

China's policy of restricting the discharge of pollutants, which was instituted more than a decade ago, has also achieved remarkable success. Since the policy was instituted the amount of fines collected by the Chinese Government rose from one billion yuan in 1981 to over two billion yuan in 1991.

At the same time, China has also attached great importance to the scientific and technological development of enterprises. This effort has led to both an improved environment and better use of resources. In addition, the nationwide afforestation program has increased forest coverage from 12 percent in 1981 to 13.4 percent in 1991.

At present, China has more than 2,000 organizations and units, engaged in environmental protection. The organizations employ over 650,000 people.

However, Chi pointed out that China, a country with a large population and low income, still faces serious future challenges in the area of environmental protection.

He said that the country's agricultural sector bears a greater burden than any other country in terms of protecting ecology and the environment. For example, the country faces a great challenge with contradictions between the supply and demand of forestry resources, shortages of water resources in the north, and maritime pollution.

Therefore, according to Chi, the Chinese Government will continue to implement appropriate and effective measures for environmental protection. China will also expand cooperation with other countries in the field of environmental protection on the basis of equality and mutual benefit.

Chelyabinsk Conference Examines Effects of Global Nuclear Pollution

LD2605023392 Moscow ITAR-TASS World Service in Russian 1902 GMT 25 May 92

[By ITAR-TASS correspondent Yevgeniy Tkachenko]

[Excerpt] Chelyabinsk, 25 May—An international conference entitled "The Ecological Consequences of Developing the Nuclear Complex in the Urals: Problems and Solutions" came to an end in Chelyabinsk today. Over five days, 550 participants representing 284 organizations from many countries discussed the global problem of combating the effects of nuclear pollution and studied the situation in the region which developed due to the operations of the "Mayak" combine, a pioneer in the Soviet nuclear industry.

The resolution that was adopted notes that the conference was a real achievement of the end of the "cold war." The time has come for the peoples of the world, particularly in the United States and Russia, to act quickly and energetically to help those who have suffered from the nuclear arms race, says the document. Humankind must act to prevent the disasters and the circumstances that give rise to them from happening again, stressed those taking part in the conference. In their opinion, there is only one acceptable way of protecting humanity—to stop developing, producing, and testing nuclear weapons. [passage omitted]

Spektr '92 Conference Considers Environment Monitoring Methods

LD2705090292 Moscow ITAR-TASS in English 2204 GMT 26 May 92

[By BELTA correspondent Dmitriy Patyko—TASS]

[Text] Minsk, May 26 (TASS)—An international Spektr '92 conference opened here today to discuss problems of ecological control. Scientists from the CIS member-states, Germany, Poland, Bulgaria, Great Britain and China will consider modern monitoring methods and devices for aero-space and ground control over the state of nature complexes.

In the opinion of forum participants, Byelarus has the most complete program of remote-control diagnostics of the environment among the former Soviet republics. Byelarus has set up an Ecomir Scientific and Technical Center for these purposes.

Devices mounted on the Mir orbiting station, the Kosmos, Resurs and Almaz satellites, planes, helicopters and mobile laboratories watch the ecological situation.

Scientific centers from Minsk, Moscow, St. Petersburg, Kiev and Vilnius put on display devices to monitor the environment, many of which have been made to military orders and meant for different purposes.

MOZAMBIQUE

Civil War's Ecological Devastation Highlighted

Plundering Armies

92WN0503A Johannesburg THE WEEKLY MAIL
in English 16-23 Apr 92 pp 19-20

[Article by Eddie Koch: "The Plunder of Paradise..."]

[Text] The 17-year war in Mozambique has devastated the lush mangroves and reefs. Desperate refugees slash and burn trees for firewood. Even the country's famed prawn industry is threatened.

War. That's why Mozambique, a lush and languid land that slips gently into the tropical waters of the Indian Ocean between Kosi Bay in the south and the Rovuma River in the north, cradles an immense ecological contradiction.

Vast tracts of savannah and indigenous woodland—bounded by an inland escarpment and a coastline of mangroves, estuaries and coral reefs—sustain a mix of animals, birds, snakes, insects, crustaceans, fish, dolphins and marine mammals that celebrate the diversity of life.

But this landscape also provides the spectacular backdrop for a 17-year civil war that has killed more than a million people and is so ferocious that it has obliged academics, who last year drafted a report on the state of the nation's environment, to state: "The most threatened species in Mozambique is mankind."

For this reason, it is understandable that concern about the flora and fauna is frequently dismissed by government officials as well as ordinary Mozambicans as an extraneous luxury, a perverse and Eurocentric distraction from the struggle by its people to survive.

But human misery and ecological degradation in Mozambique are, in fact, inextricably linked. Systematic plunder of the country's natural resources makes it possible for Renamo rebels to continue waging their war; the strife they create has, in turn, unleashed powerful forces that are busy laying waste the biotic beauty of the land.

In 1974, at the start of the war, Mozambique's elephants numbered between 50,000 and 65,000. Last year the population was 13,350 and getting smaller. Small herds that have survived the ravages of war inhabit remote regions in the northern provinces of Tete, Niassa and Cabo Delgado. A small group have retreated into inaccessible swamps in the Marromeu Delta, where the Zambezi River fans into the ocean north of Beira.

"There is now a pile of evidence which shows that Renamo [Mozambique National Resistance] hunts down these animals and uses their tusks to pay for its guns and

war materiel," says Abdul Adamo, director of Mozambique's Forestry and Wildlife Department (Departamento de Fauna Bravia).

"Five years ago, when the army over-ran Renamo bases, they confiscated 19,000 tusks from various rebel camps. Information from my staff in the field and from a number of rebel defectors confirm that Renamo poaches elephants and exchanges the ivory for guns and ammunition."

Last year government troops captured hundreds of documents when they routed rebel guerrillas from a base at Nhamagoda in Sofala province. One written by Renamo chief Afonso Dhlakama requests "the price of every missile (and)... the price of every kilogram of ivory. Renamo can arrange the ivory. Renamo can arrange the landing strip for the plane."

More recently a defector from the rebel's logistical headquarters for the Gaza province, located at Ngungwe close to the boundary of the Kruger National Park, told reporters that a group of South African soldiers arranged for the delivery of supplies to the camp in exchange for elephant tusks.

And last year a Renamo commander tried to sell a sack full of tusks to a French television crew, who were filming the electrified fence that separates southern Mozambique from the eastern Transvaal, in full view of an SADF [South African Defense Force] patrol—and the footage exists to prove this.

But Mozambique's battleground is an arena for many different armies and all of them have taken the leather and sell the shells for ornamental purposes—and the annual slaughter of mother turtles has stopped.

Now the ecologist has a new plan to persuade the islanders to replace their goats, which are denuding the indigenous vegetation, with reedbuck that can be hunted by visiting tourists and the profits shared within the community.

"I don't say protect the turtles or the corals because they are rare. I say protect the turtles because they are useful to you. This is a turning point in our philosophical approach to conservation. We are returning the natural resources of the country to the people who live close to them," says Dutton.

"We must fight against Eurocentric approaches to conservation that have failed in the rest of Africa. People are part and parcel of ecosystems and the best wildlife areas are those that have people living in them. If they like an idea, people will give it their full support."

This approach—which combines conservation with a potent form of rural development—informs the more ambitious programme to rehabilitate the network of Mozambique's other reserves when peace comes to the country.

The United Nations Development Programme has already identified this larger project as a priority for the reconstruction of Mozambique and the World Bank has made funds available for the scheme.

"Turtles are one thing. But a nyala is worth R6,000 and a kudu is worth much more than that. Imagine what we can do with our other reserves," says Adamo. "Bazaruto is a case study that works and it has allowed us to demonstrate to decision makers here how important the rehabilitation of protected areas—with the involvement of local people in their management and sharing of their revenues—is for the reconstruction of the country."

Ambitious plans to link Mozambican game reserves to similar ecological zones across the border in South Africa are an important—and controversial—aspect of the rehabilitation project.

Reports in the South African media last year distorted the programme by describing it simply as a plan to create the biggest game reserve in the world by extending the frontiers of the Kruger National Park into Mozambique's Banhine and Zinave reserves—and led to charges in the Mozambican parliament that the wildlife department was "selling" whole chunks of the country to South Africa.

"We believe it is important to bring in the skills of South African conservationists and the maintenance of biodiversity—the creation of complete ecosystems—depends on the removal of artificial barriers to the migration of species," says Adamo.

Reconstructing Reserves

92WN0503B Johannesburg THE WEEKLY MAIL
in English 16-23 Apr 92 pp 19-20

[Article by Eddie Koch—"...And the Long Road Back to Eden"; first paragraph is THE WEEKLY MAIL introduction]

[Text] The tropical paradise of Bazaruto island is a conservation model for Southern Africa.

Reconstruction. This word dominates a discussion taking place around a half-full bottle of whiskey and a log fire, its red coals fanned by a gentle breeze blowing off the sea, that burns into the early hours of the morning on one of Bazaruto Island's white beaches.

Abdul Adamo, director of Mozambique's Forestry and Wildlife Department (Departamento de Fauna Bravia), and ecologist Paul Dutton are deep in conversation with a delegation of consultants from the United Nations Food and Agricultural Organisation, who are on a whistle-stop trip around the country to evaluate the conservation work being carried out by the Departamento de Fauna Bravia, and the topic is a brave plan to rehabilitate Mozambique's once famed nature reserves.

Thirteen percent of the country's surface area has been demarcated since colonial times as conservation land,

nearly double the proportion of land allocated to game reserves in South Africa and well in excess of the amount set by the International Union for the Conservation of Nature as a target for all countries.

This chain of game reserves and conservation areas—which stretches from the Maputaland Elephant Reserve in the far south through the Banhine and Zinave Parks in the southern provinces, into the legendary Gorongosa and Marromeu reserves in the centre of the country, and on up north to the Niassa Reserve that straddles the banks of the Rovuma River—has been affected in a profoundly ambivalent way by the war.

Gorongosa has been occupied for years by Renamo, who have converted the reserve into the movement's nation headquarters, and it is the scene of fierce battles with government troops. The infrastructure of all the other parks has been destroyed by war and many of the large species have been decimated.

"But the demographic revolution that the war has created in Mozambique has left large areas of land lying fallow for more than a decade and this has had a positive affect on the diversity of plant and animal life in some of these abandoned areas," says Adamo.

"There is now a prospect for negotiated peace and Mozambique has the unique opportunity to reconstruct its conservation areas, which represent a wide range of the diverse ecosystems in the country, without having to remove people from the protected areas."

The island of Bazaruto, on which the UN's officials are being feted by Adamo and Dutton, is the largest of an enchanting tropical archipelago that—along with Margaruque, Benguera and Santa Carolina—reaches from the town of Vilanculos into an azure Indian Ocean.

Declared a nature reserve along with Margaruque and Benguera in 1970 during Portuguese rule, the island has been transformed in the past few years by the work of Dutton, the island's chief conservation officer, into a prototype for the style of conservation that Adamo's department plan to use to repair the damage done by war to the country's ecology.

Dutton, a gentle man with a deep passion for the island he lives on, is fond of taking his visitors to Coral Gardens, a few swimming strokes off the north eastern beaches of Bazaruto. This blend of hard and soft corals, which owes its existence to the nurturing currents of the warm Mozambique Current and the absence of silt carrying rivers on the Vilanculos coast, is reputed to be one of the richest on the African coast.

Livid sea fans, tangled bushels of brittle white underwater plants and magnetic blue domes of soft coral teem with shoals of tropical fish in every shape and size that mingle into a kaleidoscope of iridescent stripes and brilliant spots of colour.

Dutton calls this monument to Mozambique's biological diversity—along with red duiker, bushbuck, night apes,

samango monkeys, crocodiles, 148 species of birds and a range of snakes that inhabit the island—a living laboratory for the department's rehabilitation plan.

The Xitswa-speaking inhabitants of the island, along with about a thousand fugitives who have sought refuge here from the carnage on the mainland, are encouraged to participate in a range of schemes to protect the coral reefs, rare dugong populations, three species of rare turtles and a range of other species that thrive on and around the island.

The islanders once slaughtered green, logger-head and leatherback turtles—who return from their travels around the seas of the southern hemisphere to lay their eggs on these beaches where they were born—for their meat and shells, and plundered their nests for their eggs. But these species are now protected through an innovative "turtle farming" scheme implemented by Dutton.

The people are encouraged to identify the sites where turtles have nested with standardised markers. The eggs are then removed and, after they have hatched, the babies are kept in small tanks maintained by the villagers. After two years, half the mature turtles are released into the ocean and the other half are kept by the advantage of the lawlessness created by the rebels to loot the country's natural bounty.

Zimbabwean troops stationed along the corridor between Beira and the border are heavily involved in the illicit ivory trade and have shipped large consignments of tusks back home in military aircraft—although Mozambican conservation officials report that search procedures at the border have been stepped up since Zimbabwean troops came under the spotlight at an international conference of the Convention on International Trade in Endangered Species (Cites) held in Japan last month.

High-ranking members of the Mozambican army are also involved in the slaughter of elephants and other large animal species.

A team of conservationists who surveyed the wildlife populations of the Marromeu Delta late last year saw teams of government soldiers who hunted buffalo and hippo with automatic rifles and operated a minor industry in which meat from the animals is stripped, laid out on racks to dry and then exported in gunships for sale in the suburban markets of Beira.

"Buffalo (whose herds have made the Marromeu legendary among professional safari hunters), waterbuck, reedbuck and hippo have all declined by between 80 percent and 90 percent over the last 13 years," says the report of the survey team. "In the view of the scale and intensity of the hunting, it is likely that the bulk of the operations are for commercial gain rather than subsistence."

The London-based Environmental Investigation Agency, in a report published last month, quotes a professional hunter who claimed that government troops

"regularly wipe out entire herds of animals, including elephants, using helicopter gunships firing upon the herds from the air."

The journal *Mozambique-file* reported that members of the army are poaching elephants and smuggling large quantities of ivory in the northern province of Cabo Delgado. According to local conservation official Armando Cossa, army commanders are employing poachers and deploying them in areas along the Rovuma River that borders Tanzania.

Large mammals are not the only casualties.

Estuaries along the Mozambican coastline support five species of mangrove trees that cover 1700 square kilometres, among the biggest in Africa. These swampy forests are the breeding grounds for young prawns, a strategically vital resource which provides the country with 40 percent of its foreign exports.

And half of Mozambique's land surface is covered by sprawling forests, including indigenous kiat, jambire, Lebombo ironwood, chanfuta and tangatanga trees. The coastal mangroves as well as these hinterland forests, which form the basis of a potentially lucrative and sustainable lumber industry, are under severe threat from social dislocation caused by war.

Mia Couto is one of the country's most creative fiction writers, a man who studies the country's biological systems to inspire his literary work. "Mozambique's main environmental problems are concentrated in the three areas: the coast, the cities and along the railway 'corridors' that link the coast to the interior," he says.

Six million of Mozambique's 15-million people have been forced to flee their rural homes due to Renamo's reign of terror, designed to paralyse the agricultural sector of the country's economy. Seven out of every 10 Mozambicans now live in towns and settlements along the relatively secure coastal strip or along the Beira corridor, that is protected by Zimbabwean troops and has been exempted from rebel attack in terms of an agreement reached by the government and Renamo during recent peace talks.

And bigger cities are growing at a phenomenal rate, with Maputo and Beira housing three times the number of people they were built for.

"We are in danger of becoming a rural country without peasants," says Couto. "And, as a result, a real desert is forming around Maputo and the Beira Corridor."

Eighty percent of energy used by households and industry in Mozambique is generated by burning wood-fuels. Families who have resettled along the coast slash and burn the trees to make way for *machambas*, small fields on which they try to squeeze some food from the land. And around the cities, people forage far and wide, risking death with each kilometre they travel, to strip the countryside of its woody biomass.

As a result, half of the mangroves have been cut down in the last 10 years, leaving a potential crisis for the prawn industry, which is beginning to experience severe drops in the size of its catches. Mozambique is already classified as the poorest country in the world and if this industry collapses it will result in economic anarchy.

Sofala and Manica are provinces dissected by the heavily congested Beira corridor. "There are some of our richest forests are located in these regions," says wildlife and forestry director Abdul Adamo. "Some rivers in Manica that have dried up because of siltation that comes from all the trees at their source being destroyed."

Officials in Adamo's department have calculated that 15,000 to 20,000 hectares of woodland is stripped each year to satisfy the demand for fuelwood from the city of Maputo alone. War, and its social consequences, is the "driving force for the widening spread of deforestation around the urban areas of the country," they report.

The pressures of civil strife have created daunting crises inside the country's cities as well. Renovation work is taking place in Maputo, but the city has the feel of Beira, the provincial capital of Sofala, which American reporter William Finnegan, writing in *The New Yorker*, described in this way:

"The price of firewood had rocketed. Few working people could afford it, and they were starting to burn pieces of their houses or apartments—doors shutters, windowsills, dowsills, doorframes. They were even tearing up wooden floors... The city looked both besieged and already sacked."

One could say this will be the fate of the entire country—but for the work of men like Abdul Adamo and Paul Dutton, an ecologist and close colleague of Adamo who has spent the last 15 years of his life working in Mozambique.

Ivory Carvers

92WN0503C Johannesburg THE WEEKLY MAIL
in English 16-23 Apr 92 p 20

[Article by Blake Owens—"Carving Ivory To Survive"; first paragraph is THE WEEKLY MAIL introduction]

[Text] While the rest of the world clamps down on trade in elephant tusks, unemployed men from Mozambique carve ivory in a desperate attempt to earn a living.

On the Avenue 24 De Marco in Mozambique's city of Beira, "Co-operativa De Artesano" is painted on the window of a small shop. The room inside is dirty, unfurnished and illuminated only by the light from the window. Here, six days a week, 18 men sit on the floor, each carving a statuette from either ivory or ebony, hoping to sell it to a tourist.

The only English speaker in the group smiles, introduces himself as Eduoard Eleessane, and displays his current project—a tusk about 34cm long with a woman's face carved roughly at the base. The rest of the tusk is dirty

and smeared with blood. "It will look much nicer after it is carved and polished," he says.

The co-operative was formed in 1985. Eleessane first began carving when he finished his military service in 1988, and found no job waiting for him. "My father used to carve wood, so I joined these men." He produces two to three carvings a week.

The cost of a small carving like Eleessane's is 150,000 meticaïs (about R190—not a bad price for a single man and the two days of labour it took to produce. But, as there are so few tourists in this small town, and as the few foreign aid workers face ivory bans at home, he only manages to sell one every two or three weeks. It is enough to keep him alive. "But some of the others, the ones with families," he says, "are truly suffering."

Because the unemployment rate is even worse than the tourist trade, they keep working, hoping things will pick up. Meanwhile, behind a wooden partition in the room, tables and shelves are filling with carvings waiting to be sold.

The ivory comes from elephants in Gorongosa National Park, one of the country's more beautiful spots, situated in Sofala Province. It is also a major Renamo stronghold.

Each week, a convoy of vehicles, loaded with food and other supplies, heads from Beira to the interior. Eleessane accompanies them to the town of Inchope, where he meets military men—he insists they are Frelimo—who sell ivory from Gorongosa. Eleessane doesn't know how the ivory passes from the hands of the Renamo hunters to those of the Frelimo traders. There Eleessane encounters artisans and tradesmen who have come from other parts of Mozambique, Malawi and Zimbabwe to buy ivory.

For small tusks, Eleessane pays M25,000 (R31) a kilogram. For larger tusks, he must pay M30,000 (R38). Last week, he spent M500,000 on 20kg of ivory, enough to keep him and the other carvers busy for the next week.

Because of the Renamo presence in Gorongosa, surveys of the elephant population there are uncertain, but the government estimates Mozambique's total population at 13,350, down from about 60,000 in 1974. Eleessane assures, however, that there are still "many, many" elephants there.

Eleessane and the other carvers are not aware of the details of the controversy surrounding the trade in ivory, but they do understand that one day, a government official may come to the studio and confiscate all the co-operative's ivory. "If that happens," he says, "then I'll just start carving ebony. In any case, this is my only job. That's why I'm studying English, so I can help the customers when they come to our shop."

Xefina Island

92WN0503D Johannesburg THE WEEKLY MAIL
in English 16-23 Apr 92 p 21

[Article by Eddie Koch—"Unspoilt Places"]

[Text] Next time you go down to the Costa do Sol and are too afraid to swim for the rusty beer cans and the sewerage and silt that is carried into Maputo Bay by four major rivers, seek out a fisherman called Vasco Nham-bire.

He's the captain of one of the many dhows that dot the bay and is more than willing to take you, for a small fee of R50 (about 45000 meticaïs at black market rates), to a tiny island called Xefina where the beach sand is pure white and you can see the bottom of the sea.

The people who have crammed into bustling Maputo, a city which groans under the weight of three times the number of people it was meant to carry, generate 578 tons of waste a month.

City authorities have the resources and the infrastructure to remove only 80 of these tons, so it's not surprising that the beach is littered with junk.

There are no equivalent statistics for the raw sewerage that is pumped into the bay but health authorities are beginning to wonder if it's safe to swim.

So Xefina—which takes just half an hour to reach by dhow if the wind is right, and even less time if Vasco can borrow his boss' small outboard motor—comes as a refreshing alternative.

Once you get there, stay for the day or camp for the night. There are a number of large and shady trees to pitch a tent under. Just take your own water and food, because the island has no fresh supplies, and chat up the friendly bunch of soldiers who hang out in the ruins of the old colonial prison on the island.

It's possible to walk around the island in a couple of hours. The eastern beaches, which face the open sea, are the cleanest but exposed to the wind. On this side, the ruins of large artillery pieces, used by the Portuguese to protect the city from seaborne invasion, have collapsed into the sea.

For those with an interest in history, the prison is a relic of Portuguese colonial rule. In true Papillon tradition there are scratchings on the wall left by inmates. And, it is rumoured, prisoners in underground cells had to stand on tiptoes to keep their chins above water when the tide came in.

The fringe of the island facing Maputo is more wooded and picturesque. Dhows arrive filled with teams of fishermen who spend hours dragging their nets through the shallow water in return for a paltry catch of crabs, sardines and shrimps.

There are now 6,000 artisanal fishermen who have taken to the bay in search of protein for the families since the wartime conditions have cut them off from the machambas, the small agricultural plots they once cultivated for food.

Vasco is one of these war fugitives. His mother and father were murdered last year by a rebel group and he now relies solely on the sea to feed his family who live in a crowded room in one of central Maputo's crowded tenement blocks.

He explains how he is forced to sail all night far out into the bay, sometimes as far as Inhaca Island, to obtain ever decreasing catches of fish. "The fish is finished. There are too many people using it."

Some of the fishing crews carry axes under their nets when they visit the island. If they fail to catch anything after a few hours, they chop down a couple of trees and return to Maputo where woodfuel is becoming one of the most sought after commodities in the city.

But the island has, so far, survived the vicissitudes of war. If you can't find Vasco, negotiate with any of the other men who live in the fishing communities along the Costa do Sol. Most of them will be willing to give up a strenuous day of fishing in exchange for a guaranteed wad of meticaïs and the pleasure of your company on Xefina.

Prawn Decimation

92WN0503E Johannesburg THE WEEKLY MAIL
in English 16-23 Apr 92 p 23

[Article by Gil Laureciano—"SA Ships Strip Coast of LM Prawns"; first paragraph is THE WEEKLY MAIL introduction]

[Text] Pirate ships which sail into Mozambique's territorial waters, mainly from South Africa, are illegally stripping the coastline of its prawns—and local maritime authorities are powerless to prevent this.

Mozambican fishermen last year reported a constant presence of South African boats in Mozambican waters, primarily in Machungulo Bay 25km south of Maputo.

"They are only able to catch fish out there on the high sea as prawns are abundant only in shallow waters. So they come right in here to zones which they know are out of bounds," said Ernesto Nhambe, the director of Maritime Administration in Maputo.

The boats are usually spotted by fishermen in dhows or marine guards, who inform the maritime authorities. "We speak to them over the radio and that's how we found out they are South Africans," says Nhambe. "We immediately inform the National Maritime Directorate who lodge complaints with the South African authorities."

But the government, which spends about 45 percent of its revenue on the country's war effort, lacks the resources to stop the plunder. The maritime authorities don't have a single boat—and helicopters that could be used to control illegal fishing are engaged in anti-insurgency operations.

The export of prawns contributes 40 percent to Mozambique's foreign exchange earnings and illegal fishing is a serious threat to one of the country's most valuable resources.

"The consequences of this form of ecological destruction won't differ from those of the war in the countryside," says Luis Martins, a biologist from the state secretariat for fishing.

The government has begun to toughen up its controls on legislation and measures to prevent the overexploitation of marine resources, including a revision of the fishing calendar, limiting licences to foreign fishing concerns and penalties for disobeying the law.

Renamo: Deforestation

92WN0503F Johannesburg *THE WEEKLY MAIL*
in English 16-23 Apr 92 p 23

[Article by Gil Laureciano—"Route Into Maputo"]

[Text] Renamo rebels have mounted a new phase in their insurgency with repeated attacks on the suburbs of Maputo, Beira and Nampula—and there are indications they are using the country's fuelwood crisis to infiltrate into the cities.

Evidence supplied by peasant farmers from the Matola-Gare and Tenga regions, some 35km from Maputo, suggests that some woodcutters and transport operators are working hand in glove with the rebel movement.

Truck drivers and woodcutters have to travel up to 100km out of Maputo to find suitable trees for felling because of the extent of deforestation around the city. This takes them into territory controlled by the rebels and local militiamen suspect that some of them make deals with the insurgents, providing them with passage into the suburbs, in exchange for the right to cut trees in rebel-held areas.

A member of the militia protecting a suburb called "KM-15" on the outskirts of the city told *The Weekly Mail* that, after being tipped off by a young child, he found six rifles under a pile of firewood being carried into the city as well as two Renamo insurgents who were trying to pass themselves off as assistants.

"What happened after that was we ordered that all the lorries coming into the city with supplies of wood be searched. But it is difficult to enforce the regulation because the drivers come with cigarettes and money and offer these to the regular soldiers along the road, who order us not to stop the lorries," says the militiaman.

An assistant to one of the biggest suppliers of wood to bakeries in the city said he knew that "from time to time we carry sacks of flour to people cutting wood out there in the bush." The assistant said it was clear that these could only be Renamo members.

Another factor that aids the movement of insurgents and weapons into the city is the abolition of control posts along the roads leading into Maputo. Mozambique's new constitution, effective since 1990, guarantees the free movement of people and their goods around the country.

Thanks to Sol Carvalho and Kanemo for help with researching these articles.

SOUTH AFRICA

Wastewater Purification Works Under Construction

92WN0596B Johannesburg *ENGINEERING NEWS*
in English 27 Mar 92 p 21

[Text] Considered one of the largest wastewater purification works currently under construction in the world, the Northern Wastewater Purification Works Unit 4, situated north of Sandton, will have an installed average dry weather capacity of 200-million litres of wastewater a day.

It is the most advanced wastewater works in the world that biologically removes nitrogen and phosphorus, the two main elements responsible for excessive growth of aquatic plants such as algae.

When chemicals are used, pollution is excessive. But with the biological process Rand 15-million a year will be saved in chemicals and pollution will be reduced. The project is expected to be completed by April 1993 at an estimated final cost of Rand 175-million.

Gillis-Mason Construction of Bedfordview was awarded the Rand 60-million civil contract by the Johannesburg City Council in March last year.

The contract includes 26 circular concrete tanks 25 to 35 metres in diameter and 5 to 6 metres deep; four rectangular biological reactors 139 metres by 45 metres by 4.5 metres; a 40,000 cubic metre balancing tank, a chlorine maze and an aeration tank.

There is also a 1.6 km inlet channel, screening chambers, vortex degritters and major pipework and associated concrete boxes as well as extensive buildings.

"Not only is this one of the largest projects of its kind to be built in Africa, but it also incorporates leading technology throughout," says Rob Boutelje, Gillis-Mason's contracts manager.

Surface aeration and mixing equipment includes 20 aerators of 110 kW, 75kW and 45kW each, 16 mixers of 15 kW each, 36 mixers of 7.5 kW each and four mixers

of 1.5 kW each. The aerators are clog-free, robust and radial, which limits fine spray from entering the atmosphere.

Bateman Water Treatment was awarded the Rand 7.5-million for the supply of the diffused aeration system, axial flow, archimedes, centrifugal and progressive cavity pumps, valves and penstocks, while Biwater has been awarded a Rand 7-million contract for the supply of sedimentation tank mechanisms and screening grit removal as well as for handling equipment.

The 26 scraper mechanisms will be used in circular tanks varying in diameter from 25 metres to 35 metres, with water depths of up to 5 metres. As the process design incorporates the 4-stage improved Johannesburg configuration, a variation of the Phoredox, process for biological nutrient removal, scraper mechanisms for the eight primary sedimentation tanks have had to be designed to cope with a 10 percent sludge.

Sludge from the primary tanks is discharged to the elutriation thickeners for fermentation and the production of volatile fatty acids, essential to the process.

The mechanisms of the thickeners have been designed to operate under the extreme loadings specified and particularly the loads applicable on restarting after a prolonged stoppage. All units are peripherally driven and here too attention has been paid to wheel traction under wet conditions.

Waste mixed [liquid] from the aerobic reactors is discharged to four picket fence type-thickeners with scraper mechanisms spanning the tank diameter, while normal outflow from the reactors is settled in twelve 35 metre diameter final clarifiers equipped with conventional echelon scrapers.

A feature of the tank construction has been the use of a dummy bridge mechanism to ensure that the tank floors, which are cast in finished form, follow the peripheral wall profile accurately.

Biwater will also be supplying a number of backraked channel screens together with fine screens for the removal of screening from settled sludge, screenings dewatering presses and a grit classifier.

Design of the civil works is carried out by consulting engineers Watermeyer, Legge, Piesold and Uhlmann, who are responsible for the mechanical and architectural design as well as overall project management. Process design is by the Johannesburg City Council Wastewater Department and Electrical Engineering by Watson Edwards van der Spuy.

State of Wastewater Treatment Processes Assessed

92WN0506A Johannesburg *ENGINEERING NEWS*
in English 27 Mar 92 pp 18, 33, 35

[Interview with Gerrit Botha, president of the Water Institute of South Africa, by Sienne Rosenberg; place and date not given]

[Text] South Africa has been a world leader in the research and development of wastewater treatment processes for many years, with the Water Act of 1956 setting standards higher than in most other countries. However, standards have now been tightened up worldwide and, in some cases, surpassing those in South Africa. Are South Africa's current wastewater treatment standards stringent enough? President of the Water Institute of South Africa Berit Botha spoke to THE ENGINEERING NEWS staff writer Sienne Rosenberg about this and other issues.

What are the most technologically advanced methods of treating sewage, and are these being applied in South Africa?

The most technologically advanced wastewater treatment method used worldwide is the activated sludge process, in its various forms.

It was first introduced in South Africa about 50 years ago and has gradually supplanted the biological trickling filter process, which is still in general use, producing treated effluents of acceptable quality.

How successful is the biological nutrient removal process in the purification of sewage?

With the developments over the last 10 or more years the biological nutrient removal processes (BNR) have been very successful.

Problems are still being experienced in a number of instances where nitrate and particularly phosphate removals do not always meet requirements, but there is now a better understanding of the various factors that play a role in nutrient removal and this is being used to achieve excellent results.

Over the years South Africans have been in the vanguard of nutrient removal research and development and this is widely acknowledged. We now have many people who can successfully apply these processes.

There is currently a debate as to whether the activated sludge method is the best method of treatment, especially as the biofilter method is cheaper in terms of labour and maintenance. What is your institute's opinion in this regard?

I am surprised to hear that there is a debate about which method is best, as the activated sludge process is generally the process of choice.

However, the selection depends on circumstances, and biofilters can still be justified and are being built.

The activated sludge process requires a higher degree of operator competence and biofilters are sometimes preferred for small installations especially where there is little or no supervision.

The capital cost of biofilters is high, but operating costs are significantly lower than for activated sludge plants which are completely dependent on electricity. For smaller plants the choice really depends on the quality of treated water required for the particular circumstances and the availability of suitable operators and/or supervision.

How does South Africa compare with other countries in the field of sewage treatment, are our standards internationally acceptable?

Without question we compare very well with other countries.

In so far as the standards applicable to the discharge of sewage and other wastewaters to the environment, there is no doubt that South Africa introduced high standards. The Water Act of 1956 set standards that most other countries were slow to follow.

Over the years other countries have tightened up their standards and in several cases are now demanding higher quality standards for particular constituents than we are.

Some would say that they are going overboard in certain respects, but this is debatable.

There is a tendency for standards to be tightened up as analytical methods improve and lower levels of contaminants can be determined accurately, down to the micro and nanogram concentration levels.

Beyond a certain point the tightening of contaminant discharge standards cannot in my view be justified.

Is the Water Act of 1956 stringent enough in terms of pollution in your view? Does it deal adequately with the prevention and handling of pollution?

The Act was amended in 1984 and tighter standards were laid down which are generally stringent enough.

Possibly some standards can be raised, but certainly the Department of Water Affairs does not use the powers that it has firmly enough to ensure that the standards are always met.

There is an understandable tendency to make allowances and give offenders a fair chance to put their houses in order. Unfortunately some of them abuse these concessions.

The department's attitude is, however, reasonable in view of their recent declared policy of introducing a system of waste load allocations for each river system.

This means that the ability of a receiving stream to handle waste loads, without prejudice to downstream users, is taken into account and industries and municipalities along the stream are allocated certain relaxed

discharge standards. The situation will of course be closely monitored by the department to prevent abuse.

In his paper on human viruses in water, WOK Grabouw, of Pretoria University's Department of Medical Virology, mentions that the incidence of infectious diseases associated with water is on the increase. What is your view and is enough being done in South Africa to curb this trend?

One cannot but agree with Dr Grabouw that the incidence of infectious diseases associated with surface and some ground waters is on the increase.

The problem is rearing its head in many parts of South Africa and we are all extremely concerned.

What has to be done to curb the spread of disease is known; but there is just not enough money.

Essentially the growth of informal squatter settlements is at the root of the problem and the consequent lack of sanitation and the supply of wholesome drinking water provides the impetus for the spread of disease.

WISA [Water Institute of South Africa], in close collaboration with the International Water Supply Association, has organised a number of symposia in various parts of southern Africa as part of a Water Decade programme, aimed at finding solutions for the supply of good quality potable water and providing opportunities for technology transfer in third world circumstances.

I do not think enough is being done at the moment but this is due to finance and manpower constraints rather than lack of interest.

What is South Africa doing to limit the discharge of effluent into the sea, or at least to control its impact on the marine environment? What are the alternative methods of discharge for coastal areas?

We are doing a tremendous amount to control the discharge of effluent into the sea.

The Department of Water Affairs has had a very enlightened policy over a long period.

Each new application is looked at very carefully before another pipeline is allowed to discharge effluent into the sea.

Extensive investigations are carried out by independent bodies like the CSIR [Council for Scientific and Industrial Research] and marine research organisations where things like ocean currents and dispersion are looked at.

Occasionally accidents do happen such as the pipeline at Greenpoint in Cape Town.

However, sea disposal is still by far the most economical method of disposal, provided that necessary pretreatment is applied and that the discharge system is well designed and engineered.

I have a very strong view on debates of this nature—they become too emotional, and we must endeavour to get facts from people who apply sound scientific and engineering principles.

Although the International Water Tribunal did not find Thor Chemicals guilty of polluting the Mngweni river with mercury, they are concerned by Thor's actions. Do you think that paralegal bodies such as the tribunal have much weight in enforcing their decisions?

I don't know too much about this situation, but I don't believe that people should be allowed to get away with even accidental discharge of highly toxic substances into rivers.

One does not want high risk situations in a sensitive catchments and irresponsible behaviour must be firmly dealt with.

At present we are using partly purified sewage to cool water towers at the Kelvin power station—what other uses are there for the products and by-products of treatment? Is enough use being made of these?

Apart from its widespread use for cooling purposes, treated sewage effluents are also used for irrigation, which incidentally, is probably the major water consumer in South Africa.

The quality of water used for irrigation is of considerable importance and quality standards have been laid down to control the discharge of substances such as sodium chlorides and boron which have adverse effects on soil conditions, the quality of and certain sensitive plants.

Indirect reuse of sewage effluents is generally practised when they are discharged into rivers and the river water is abstracted downstream.

Direct reuse for potable purposes is only really justified in coastal areas, where, if the water is not used, it is lost to the sea. However, direct reuse in factories where water of a reasonable quality can be used for industrial purposes should be encouraged.

What are the main issues facing your institute and how are you dealing with these?

We have been spending quite a lot of time having a re-look at our objectives, and here I must refer to the mission statement that we have formulated outlining these:

"WISA provides a forum for the exchange of information and views to improve water resources management in southern Africa."

When we say exchange of information this does not preclude the generation of information. If we see there is a need to conduct investigations and to do research, we do pressurise the relevant bodies to do this.

We are also expanding our membership so that we can be truly representative of the water industry as a whole.

One of the projects we are currently undertaking is the formation of technical groups. Several of these have already been established already dealing with membrane technology, mine water, anaerobic processes, nutrient removal, etc.

This is not the artificial creation of groups because we think they are a good idea—they are established where there is a need and a nucleus of interest.

Another major issue is the training of operators. A considerable amount of money has been spent upgrading processes and technology, but what we now need is trained operators who are competent to run these processes.

These people need not have degrees or diplomas—what we are really focussing on is competence. We also believe that there must be an authority that will ensure that teaching and training standards at technical colleges are suitable for our industry.

We would also like to see the image of the person working in the water field, particularly the sewage field, raised. There is something of a stigma attached to people who work in sewage works and they are sometimes regarded with suspicion. The public does not seem to realise that these are the people who they have to rely upon for the high standards of treatment that must be maintained.

Are there any other comments you would like to make with regard to this topic?

From a purely personal point of view I feel that anybody who gets involved in the water field need never look around for other things to do because the work one is called on to do is always fascinating and challenging.

Water is a basic necessity and you get involved in just about every facet of society, so it makes for a very interesting career.

Government Reportedly Approved Toxic Waste Imports

*92WN0454B Johannesburg SUNDAY TIMES
in English 29 Mar 92 p 7*

[Article by Ryan Cresswell: "Government Gave Nod to Toxic Waste Imports"]

[Text] Millions of tons of toxic waste have been imported by Thor Chemicals to South Africa since 1986—with the government's approval.

Thor's plant at Cato Ridge—which includes the world's largest mercury reclamation facility—was shut down last week pending an investigation into the cause of mercury poisoning among workers.

Thor, owned by a British company, has consistently denied that it could be a dumping ground for the world's toxic waste.

But in July 1989, the company was listed by the international environmental protest group Greenpeace as a major importer of toxic mercury waste.

Between 1986 and 1989, an estimated three million tons of toxic waste were shipped to the plant from U.S. Cyanamid, based in New Jersey. Most of the toxic waste was in sludge form.

Ordered

The waste is a by-product of catalysts made in Natal and exported to Thor's clients abroad. As a service to its clients, Thor repurchases materials containing mercury after the compounds have been used, and extracts the mercury by means of a condensation process.

Since 1989, the operation has been approved by the Department of Environmental Affairs, which says the products imported by Thor do not fall within the government's definition of toxic waste.

However, in April 1990, the Department of Water Affairs ordered Thor to suspend the part of its operation that produced mercury effluent.

This followed tests on water from the Umgeni River—used by residents of Kwazulu for bathing and drinking—which showed mercury levels of 1,000 parts per million—hundreds of times above the World Health Organisation's maximum drinking levels.

A month later, Thor denied an independent medical team access to its plant to carry out health tests on workers.

Managing director Steve van der Vyver said the decision had been taken by the parent company in Britain.

Secrecy

This prompted Earthlife Africa to issue a statement saying countries such as Britain, the United States, Italy, Germany, France and Australia were taking advantage of South Africa's "poor" environmental legislation and exporting massive amounts of toxic waste to South Africa.

South Africa is not a signatory to a December 1989 agreement by 68 countries banning trade in toxic waste, and as a non-member, is not bound by Organisation of African Unity resolutions in May 1988 and July 1989 which supported a ban on the import of toxic waste to Africa.

Last month, the Amsterdam Water Tribunal—which meets only once every four years—was told by members of Earthlife that the South African government had allowed Thor to cloak its operations in secrecy, and that all attempts to obtain and publish details of alleged pollution and human contamination had been obstructed.

The company was acquitted, although the international jury of scientists found that the plant could well be

polluting the Umgeni River. However, the environmentalists had failed to provide sufficient proof.

On March 11, representatives of the Department of Water Affairs and Thor met to discuss the company's progress in improving its mercury effluent disposal since 1988.

Ten days later, the mercury acetate plant was shut down pending a full investigation into the mercury poisoning cases by the Department of Manpower.

It will be conducted by Professor Tony Davies, head of the National Centre for Occupational Health, and paid for by Thor.

Thor Chemicals is an international chemical manufacturing company with seven branches around the world. The parent body is Thor Holdings, based in Kent, England.

Last November, the company's Transvaal manager, Mr. Alan Kidger, was murdered, dismembered and put in his car boot on the Reef. He was covered with a black substance which was thought to contain mercury. Police are still investigating his bizarre death.

Poisoned Men Face Slow Death

Thor chemicals says it is "mystified" by the outbreak of mercury poisoning among its workers.

But Mr. Mark Colvin, of Natal University's Industrial Health Unit, firmly believes the company is to blame.

Mercury poisoning—for which there is no cure—can lead to a lingering death. This is the fate that faces two of three employees at Thor's Cato Ridge plant who are being treated for mercury poisoning in Durban hospitals.

Mr. Peter Cele is in a semi-comatose state. His hands have been tied to the bed in Wentworth Hospital and he reacts only to painful stimuli. He has no control over normal bodily functions. He lies on his back in the bed, his eyes staring wildly and his legs splayed, hooked up to intravenous tubes through which flow the sustenance and medication he needs.

A few kilometres away, at King Edward VIII Hospital, Mr. Engelbert Ngcobo lies close to death, according to Dr. Colvin. The condition of both men has deteriorated rapidly since they were admitted to hospital three weeks ago.

The third victim, Mr. Albert Diamini, was admitted to St. Augustine's Hospital when he developed problems with his legs. After heavy treatment involving many painful injections he seems to have stabilised.

Dr. Colvin said: "Mr. Ngcobo is probably going to die soon. There is very little chance of workers suffering from mercury poisoning recovering. The damage is irreversible."

The first symptoms the men experienced were feelings of numbness in their hands and feet.

"Mr. Diamini, who is still lucid, said he was working at the plant until a week ago. He said he complained that he was having difficulty walking but was told to carry on working."

These men are not the first victims of mercury poisoning at the plant. Last December, Dr. Colvin's unit traced nine former employees and found that five of them had suffered ill effects from exposure to mercury, a potent brain toxin.

Dr. Colvin claimed that Thor did not take proper health precautions. But Thor managing director Steve van der Vyver says his company is "mystified" because the men's condition is not consistent with levels of mercury in their urine, tested weekly by Thor in accordance with recommended international standards.

But according to Dr. Colvin, Thor's 1991 company records show that more than 87 percent of the current workforce exceeded the test limits. "The average level was four times the World Health Organisation's limit of 50 parts of mercury per billion in urine," he said.

Mr. Van der Vyver said his plant used a scale of 200 ppb and claimed "many other" factories did the same

Dangers of Imported Toxic Waste Dumping Revealed

92WN0451A Johannesburg VRYE WEEKBLAD
in English 3-9 Apr 92 p 16

[Article by Chris Albertyn, spokesperson for Earthlife Africa: "Recycling Death?"]

[Excerpt] The poisoning of workers with imported toxic mercury waste at Thor Chemicals in Natal is a warning of worse to come. The World Bank thinks Africa is "under-polluted" and South African government is hurrying in their quest to redistribute this perceived inequality. While European lawmakers have put the squeeze on their own dangerous waste generating industries, they are encouraging them to relocate elsewhere. A classic battle of North and South is looming and the pre-New South Africa is clearly on the side of the North. There is hope yet. [passage omitted]

Third world outrage led to a gathering in Switzerland in 1989. On the agenda of Third World countries was an outright ban of all exports of toxic wastes from industrialised countries. However, given the strength of U.S. and European interests, the Basel Convention, as it became known, ended up becoming a treaty that legalised a controlled trade in toxic wastes.

Not satisfied with this, sixty-eight countries from Africa, the Caribbean and the Pacific, collectively known as the ACP [African Caribbean and Pacific] countries, pressured officials from the European Economic Community (EEC) into banning all radioactive and hazardous

exports from the EEC to ACP countries. This has become known as the Lome IV Convention. At the same time many individual countries were quickly closing the sluice gates. Eighty-three countries outside of Western Europe and the United States have now banned waste imports. South Africa is the only African country to allow toxic waste imports.

Dumping by Another Name

As the noose tightened on Western dumpers, so they began to seek legal loopholes. Voila, traders soon found they could still ship their toxic wastes halfway around the world as long as they said it was for recycling purposes.

The British owned Thor Chemicals plantation sage is but one example. The mercury "recycling" plant at Thor in Cato Ridge is the world's largest. More than half of the toxic waste burnt there comes from Europe. While recycling in itself makes environmental sense, where toxic waste is concerned it is a very deadly and dirty business that is not allowed in industrialised countries.

Earthlife Africa (ELA) has copies of official documents showing that the toxic waste imported from the United States by Thor is high in dangerous organic compounds, between 30 and 40 percent by volume. There are five mercury recycling plants in the United States but not one of them will touch waste with an organic content of higher than three percent. This is why workers at Thor are landing up comatose in hospital, and why the Mngceweni River is so laden with mercury. The stuff is not only too hot for the most advanced countries to try and recycle, but also too expensive for them to just dump. It is just cheaper for them to build a so-called recycling plant in a country with fewer controls.

There are of course non-mercury substitutes that could be used, but that would up the internal economic costs to the producer rather than, as presently is the case, externalise them to unsuspecting workers, the public and a voiceless environment.

Thor claims to import only those wastes that are generated from products they sell to overseas buyers. However, both ELA and Greenpeace are following up reports that foreign companies are solving other toxic waste problems by diluting the mercury waste with anything and everything. By Thor's own admission their Cato Ridge plant is the only one in the world that can deal with "small amounts of mercury in large amounts of waste."

Government departments are protecting Thor by refusing to release information to the public. It would not be good for investor confidence if they were seen to be hampering the free trade of a multinational company. What is more, so-called experts advise that investments like Thor's are environmentally desirable. In June 1990 the Wildlife Society requested the President of the Institute for Waste Management, Ray Lombard, to investigate why ELA was making all this fuss over Thor

Chemicals. Lombard didn't talk to ELA but visited the plant and released a press statement in the name of the Wildlife Society, one which commended Thor for their exemplary standards and encourage them to expand their operations.

Amongst other praises Lombard sang, he said: "The Wildlife Society carefully evaluated the situation before taking a stand... Occupational health and safety enjoys a very high priority at this factory." All the while, government, Lombard and others knew that Thor was exceeding, by at least four times, the mercury/urine danger level recognised by South Africa, The World Health Organisation—50 micrograms of mercury per litre of urine. Lombard even claimed that standards set by Thor—200 micrograms per litre—were "superior."

What are the implications of all this? While markets and movements of investment capital are global in scale, social and environmental standards differ from country to country. In raising the level of standards in the United States and Europe, lawmakers are forcing corporations to relocate to countries with lower standards. Greater profit is possible if they can externalise, or pass on the environment and health costs to the local people.

The Thor case indicates that the present government, in looking the other way, is using economic externalities like people and environment as a major sales pitch. Trends in the present global political-economy of pollution point to the New South Africa as the ideal investment for multinational corporations who are being squeezed back home, particularly in a unified Europe.

But why, you may ask, is Europe allowing capital to profit from double standards which in essence translates to mean that mercury is 25 times less poisonous to an African than a European? Economic self-interest is the only answer. It is exactly these dynamics which prompted the OAU [Organisation of African Unity] to say: "Africans realised that we would have to take the responsibility for protecting our own continent as it was clear that many industrialised nations were unwilling to help us do so."

Africa has taken responsibility. Becoming aware of the pollution transfer loopholes, the OAU convened in January 1991 to draw up the Barnako Convention. This forty-five page convention is the most comprehensive yet in that it not only bans the import of toxic wastes but imposes extremely strict controls of the movement of dirty industries to Africa.

"The issues of preventing the transfer to Africa of polluting technologies shall be kept under systematic review by the Secretariat of the Conference and periodic reports shall be made to the Conference of Parties."

It is significant that in March this year the OAU representative to the European Parliament, Cheikh Niang,

attended a press conference in Brussels to hear what ELA had to say about European toxic waste exports to South Africa.

The European Council was called upon by the Polish and Czechoslovakian governments, as well as Greenpeace and ELA to ban all exports of toxic waste. "Poland has banned the import of hazardous waste even for recycling processes," said the Chief of the Polish Environment Inspectorate, Wojciech Swiatek. "But it is very difficult to enforce such a ban without the cooperation on both sides of the border. Both import and export bans must be introduced. This is what we need from the European Community, not toxic waste," he said.

However, bowing to pressures from industrialists, the European Council not only approved continued exports to lesser developed countries outside of the ACP alliance, they angered many parties by removing any controls on a whole group of toxics. Among this group are toxic and cancer-causing chemical wastes that even the U.S. Environmental Protection Agency recognises as highly toxic and in the case of cadmium and beryllium are cancer-causing. Also among this list of 22 dangerous wastes are "spent catalysts," which is what Thor claims to import.

No wonder then that the OAU realised that they could not rely on the EEC [European Economic Community] to protect them. The present South African government, advised by its "experts," is modelling its policies on those of the EEC.

There is hope yet though. The ANC [African National Congress] has publicly stated that it would implement an outright ban on the importation of toxic wastes. What is more, it is very likely that South Africa will, at some stage, become a member of the OAU. This affiliation would have to force a new government to look after African interests first, rather than trading its people and environment in the interests of short-term economic gain.

The question now is, how long will the present administration keep moving in the opposite direction to what must ultimately come about? Unless the public makes noise now, we can only sit back and count how many workers will die and rivers become toxic sewers until sanity prevails with a new government concerned with Africa first.

Palmiet Dam Proposal Threatens Kogelberg Reserve

92WN0499A Cape Town *THE ARGUS* in English
13 Apr 92 p 6

[Article by John Yeld, Environment Reporter: "At Stake—The Heart of Cap's Floral Kingdom"]

[Text] Extinction is forever, the saying goes. So if a particular plant or animal species occurs nowhere else on earth, are you justified in putting it at risk for the sake of saving a few rands?

That's the question concerned conservationists are asking as various proposals to dam the pristine lower reaches of the Palmiet River near Kleinmond come under intense scrutiny.

The river runs through a biological treasure chest called the Kogelberg conservation area—literally and figuratively the heart of the Cape floral kingdom.

This invaluable area contains some 1,600 plant species—about 25 percent of all fynbos plants and more than the entire British Isles—of which at least 150 are endemic, occurring nowhere else on earth.

There are compelling reasons for keeping the Kogelberg unspoiled—ethical obligations, recreational and environmental education opportunities, economic spin-offs in the form of tourism, are among others.

The most important reason is perhaps still in the realm of the future—what genetic benefits are there waiting to be tapped in these hundreds of different plant species?

Ask any parent with a child with leukemia whether they would allow the humble rosy periwinkle plant to be wiped out by dam construction. For it was discovered fairly recently that this pretty little plant from Madagascar yields vincristine and vinblastine which, when used with other treatments, increases the long-term complete remission chances of children stricken with leukemia from 20 to 80 percent.

"We're trying to be as constructive as possible about this," explains Dermot Judge of the Botanical Society's Palmiet River Special Interest Committee.

"The policies of the committee are, firstly, to do our best to delay the damming of the Palmiet until all the alternatives have been considered. We consider the decision is going to be made prematurely.

"And secondly, we support the biosphere concept." (An application is being made to Unesco to declare the Kogelberg a biosphere reserve.)

He said the various Palmiet dam options would provide sufficient water to meet the rapidly increasing demand of the Cape metropolitan area for only a short time—probably for about 10 years, possibly as little as five.

"Then we will have to go for desalination and the Palmiet will have been destroyed. The public must be informed of the true price," he said.

According to a report by a Water Affairs' Palmiet working group, any of the proposed major dams and weirs within the Kogelberg state forest would have major—"and even catastrophic"—direct consequences for the integrity, natural diversity and wilderness character of the conservation area.

Some of the alternative proposals—to dam the Palmiet River north of the Kogelberg—would also affect important natural areas, but could have beneficial effects for

maintaining an adequate river flow and keeping the estuary at Kleinmond open, the report added.

An application to have the 30,000-hectare Kogelberg conservation area declared a world biosphere reserve is ready and will be forwarded to the United Nations soon.

But the application will automatically be disqualified if any of the various proposals to dam the lower Palmiet River, which runs through the centre of the Kogelberg, are applied.

This was revealed at a recent media briefing organised by the Botanical Society, which has launched a Palmiet River Special Interest Committee to investigate all the possible water options for the Western Cape.

The committee is hoping to persuade the Department of Water Affairs to delay its decision-making programme for damming the lower reaches of the Palmiet.

The department has embarked on a concerted public involvement campaign to consider the various options for tapping the Palmiet, as part of its commitment to Integrated Environmental Management (IEM) procedures.

But it has recently run into criticism and has now been asked to re-schedule a major workshop on the issue, planned for mid-year.

The Kogelberg, which includes existing nature reserves and proclaimed state forest, is considered the "heart" of the Cape floral kingdom and Cape Nature Conservation is applying to have it declared a world biosphere reserve by Unesco, the United Nations Educational, Scientific and Cultural Organisation.

Biosphere reserves make allowances for both conservation and development by having a system of core conservation areas surrounded by transitional zones which can be used in various ways.

Mr. Greville Ruddock, one of the Cape Nature Conservation officials responsible for managing the Kogelberg, told journalists their biosphere reserve application was ready.

"It will be going through to Unesco quite soon," he said.

"But the core area (of any biosphere application) has to be particularly pristine and damming will disqualify the Kogelberg—definitely."

Country Signs Montreal Protocol To Protect Ozone Layer

MB2005072492 Johannesburg SABC TV 1 Network in English 1800 GMT 19 May 92

[Text] South Africa has become the first African country and the 20th nation in the world to accept the amendments of the Montreal Protocol for the protection of the ozone layer. South Africa became a party to the protocol in February 1990. It was drafted in 1987. The original aim of the agreement was to reduce by 50 percent the amount of chloroflouro carbons, or CFC's, being released into the atmosphere by the year 2000. CFC's deplete the earth's protective ozone layer, allowing dangerous ultraviolet rays to reach the planet's surface. The amendment now stipulates a 100 percent phasing out of CFC's by the end of the century. The agreement becomes officially effective from the 10 August

SWAZILAND

Rhino Horn Poaching Reaches Crisis Proportions

92WN0508A Johannesburg SUNDAY TIMES in English 26 Apr 92 p 1

[Text] Sixteen members of a rhino horn smuggling syndicate were arrested after a running gun battle at Big Bend in Swaziland over Easter.

Describing it as a major breakthrough, a Swaziland conservationist said: "It was a hell of a bust—I am very happy. But we still have to get the men at the top."

One poacher was gunned down in the parking area of the Big Bend Inn on the Wednesday before the Easter weekend and died on the way to hospital.

Another gang member—who was allegedly in possession of two horns from freshly butchered rhino—is paralysed for life after a bullet hit his spine.

Denied

Witnesses said the battle in the parking lot was like "something out of a Wild West show," with a number of scars belonging to hotel guests damaged in crossfire.

Reports that South African "agents" were involved in the operation were denied this week by Major Piet Lategan, head of the SAP's [South African Police] Endangered Species Protection Unit.

The undercover operation was launched two weeks ago after three rhino had been poached in less than a month at the Mkayi game reserve.

Six members of the rhino horn smuggling syndicate, armed with AK-47s, were striking a deal with prospective buyers—two white men and a woman—when game rangers moved in on the hotel.

Two rhino horns were being inspected by the buyers and, as the deal was struck, armed rangers emerged from the bushes.

The poachers took cover behind parked cars and a gun battle erupted.

In follow-up operations another 10 members of the syndicate were arrested.

Several of them were also wanted by the Swazi police for armed robberies.

In terms of a royal decree, the arrested syndicate members may be kept in custody for an indefinite period while investigations continue.

In a sequel to the fatal shootout, Mr Ted Reilly appeared in court in Mbabane on Friday charged with contempt of court.

The case was postponed to May 1.

In an affidavit filed with the court, Chief Justice David Hull and Mr Reilly had tried to procure his (the Chief Justice's) intervention in a criminal case stemming from the Big Bend shootout.

Swazi police say they are investigating charges of murder, abduction and contravention of the Arms and Ammunition Act stemming from the gunfight.

Rhinocide

There are only 13 white rhino left in Swaziland's national parks—and they have been dehorned by conservationists in a desperate attempt to save them from poachers.

The animals are the sole survivors of herds that were reintroduced to Swaziland in the 1960s, including 60 rhinos from the Natal Parks Board. A few years ago their numbers had increased to around 110.

Then they fell victim to what conservationists call "the rhinocide"—a wave of continent-wide poaching to feed demand for rhino horn in the Far East, where it is mistakenly believed to have aphrodisiac properties.

By the start of the 90s, more than 80 rhinos in state game reserves had been slain. In the past few years the remainder have been reduced to 13.

Surviving

Conservationists are convinced that proper enforcement of the law would solve the poaching problem, restore wildlife to its former abundance, boost the tourist industry and save the rhino from extinction in Swaziland.

But for the time being, says Swazi conservation chief Ted Reilly, the options are dehorning or exporting the surviving rhino to safe reserves in South Africa.

Maturity

Grotesque though it is, Swazi conservationists opted for dehorning last year. Over a period of several weeks the remaining rhinos were darted in the reserves and the horns—which are made up of closely knitted hairs—sawn off while the animals were anaesthetised.

But even this is not a permanent solution, as the horns grow again within five years. Calves are not dehorned until they grow to maturity.

Removing the horn changes the animal's characteristic profile dramatically, but it does not appear to have an adverse effect on lifestyle or personality.

Since 1970 poachers have slaughtered 62,000 black rhino in Africa.

Today the black, or horn-lipped, rhinoceros population of Africa stands at under 3,500—a decrease of nearly 95 percent in the past 22 years. Swaziland's black rhinos are down to six.

In South Africa the situation is fairly safe so far. Thanks to good conservation, it has 800 black rhinos, more than 20 percent of the world population.

But Mr Reilly warned this week that the poachers would strike in South Africa next. "Make no mistake," he says, "poaching will kill off South Africa's rhinos too, just as it is in the process of doing in the rest of Africa."

Mr Reilly, who is Swazi King Mswati's top adviser on conservation, says the country has probably the strictest anti-poaching laws in the world.

But, he claims, indifference—and often corruption—on the part of court officials and police have helped to decimate the once abundant white rhino population of the national reserves.

Stolen

Mr Reilly says indigenous poverty and easy access to Eastern markets via a growing number of Chinese residents have turned rhino poaching into a vastly profitable industry.

Each rhino horn earns local poachers from Rand 2,000 to Rand 4,000. It fetches five times as much in the Far and Middle East.

"The courts are a joke," Mr Reilly says. "Swaziland must be the only country where a poacher is handed back the weapons he was poaching with before his case comes to trial.

"It's top of the list for missing court records. And where else can car thieves drive to court in the stolen vehicle to stand trial while the car-owning complainant walks to court?"

Mr Reilly cites the case of a bishop of a large local sect who was found in possession of a rhino horn.

He was acquitted because his lawyer argued that the law prohibited possession of only black or white rhino horns, and there was no evidence that the horn in question wasn't from a "brown" rhino.

Last month three men were arrested for poaching in Hlane reserve—where the carcasses of 35 rhinos have been found in the past few years.

As required, the accused's vehicle and a shotgun were confiscated pending the outcome of the trial. But the magistrate ignored the law and returned both vehicle and gun to the accused before the trial.

Expense

Ironically, Swaziland is still among the best places in Africa to see un mutilated white and black rhinos—in the privately owned Mkhaya nature reserve, which has been enclosed with an electrified fence at enormous expense.

But even more rhinos are poached. One white rhino was killed for its horn last month. Two weeks later another two were butchered. There are now only 26 left in the reserve.

Survey Results on Power Plant Emissions of Nitrogen Oxide

92WN0440B Beijing DIANLI JISHU [ELECTRIC POWER] in Chinese Vol 25 No 1, Jan 92 pp 8-16, 7

[Article by Bi Yusen [3968 3768 2773], Liu Zhenqi [0491 2182 3825], Tian Lanying [3944 5695 5391], and Lei Zhaotuan [7191 0340 0957], Xi'an Heat Engineering Institute: "Evaluation of Nitrogen Oxide Emissions From China's Power Plants"]

[Excerpts] Abstract: This paper presents data on emissions of nitrogen oxides (NO_x) by 59 representative power plants in China and briefly describes the current status of NO_x emissions from Chinese power plants in order to provide scientific data for the drafting of state standards. The survey results indicate that in 1988, China's NO_x emissions had already reached 1.328-1.661 million tons and that emission levels will increase at the high rate of 29-38 thousand tons for each increase of 10 billion kWh in power generation. As a consequence, the task of controlling NO_x emissions is an immense one. The survey also identifies the main patterns by which the nitrogen content of fuels, the types of fuels, boiler design characteristics, burner design, slag removal, and operating modes have on NO_x emissions.

I. Introduction

Nitrogen oxides (NO_x) in boiler stack gas are among the atmospheric pollutants that must be controlled. Decreasing the NO_x emissions of power plants has been the subject of close attention in the industrially developed countries as well as an important subject of study for experts on combustion technology, power equipment construction, and power plant operation. The environmental protection laws of all industrially developed countries are incorporating increasingly stringent limits on NO_x emissions associated with combustion, and stern reality has compelled the relevant departments to conduct experimental research on decreasing NO_x emissions, which has yielded substantial results.

In recent years, China's electric power industry has been developing rapidly, and the installed generating capacity of fossil-fired power plants has been steadily increasing. But the problem of NO_x pollution is also becoming steadily more troublesome. In order to protect the ecological environment, we must understand the status of NO_x emissions by China's fossil-fired power plants, investigate the laws of NO_x formation and consider appropriate control measures.

II. Survey Techniques

In the last few years, certain organizations in China^[1, 2] have measured NO_x emissions by several power plants, obtaining extremely valuable data. But these organizations had relatively few measurement units, their survey dealt with only a limited range of coal varieties, and the full range of boiler designs was not covered; as a consequence, these earlier survey results do not give an

adequate indication of the overall level of emissions by China's power plants. As a consequence, under arrangements made by the science and technology administration of the Ministry of Energy, in 1986 and 1987 the Xi'an Heat Engineering Institute carried on a rather extensive survey. Its objectives were as follows: to gain a comprehensive understanding of the current status of NO_x emissions by China's power plants, to provide reliable primary data for state policy making, and to determine what factors and types of operation affect NO_x emissions by what mechanisms, in order to accumulate experience that could be used to develop technologies capable of decreasing NO_x emissions.

A. Subject Matter of the Survey

The survey concentrated on emissions of NO_x from generating units with capacities of 100,000 kW or more. But in order to gain an idea of the current status of NO_x emissions, some consideration was also given to smaller generating units located in large cities or areas with high population density.

In order to gain the most comprehensive possible understanding of the effects of the various factors, the following data were collected: (1) NO_x emission levels by power stations of various sizes; (2) the effect of the variety of coal and its nitrogen content on NO_x emissions; (3) the effect of boiler design characteristics on NO_x emissions; (4) the effect of burner design on NO_x emissions; (5) the NO_x emission levels of plants using various slag removal techniques; (6) the effect of operating modes on NO_x emissions.

B. Measuring Instruments

The measuring instruments were ECL-77A automatic NO_x analyzers produced by the Yanagimoto company in Japan. The instruments could be used for continuous measurement of the NO_x content of stack gases from fixed emission sources; the highest measurable level was 500 mg/liter, and the error of the instruments was 2 percent.

The instruments made use of the pressure-reduction chemiluminescence principle. In addition to the main unit, they included a magnetic oxygen analyzer closely integrated with the main unit, which measured oxygen concentrations concurrently with the NO_x measurements. The sampling location could be chosen at will. In order to increase measurement accuracy, the instrument was also equipped with a heated sampler and a stack gas preprocessing unit. Cooling and removal of water converted the sample to dry, water-free gas. The analytical results were expressed in terms of the NO_x content of the dry stack gas by volume.

C. Sampling Method

Depending on the site conditions, one of the following two sampling methods was used.

1. If the site had a suitable location for placement of the instrument, a stack gas sampling hose was connected directly to the instrument to allow direct, continuous analysis. When the boiler was in steady-state operation, each operating mode was continuously analyzed for 30 minutes, and the readings were stored to allow calculation of average values for the operating mode in question.

2. When the site lacked a suitable location for placement of the instrument, a special sampling bag was used. Each bag was used for 10 minutes of sampling, and the sampling volume was about 10 liters. The sample was then taken to the instrument for chemical analysis. Two or three samples were taken in each operating mode and their average was taken as the value representing that mode. Because a certain amount of time elapsed between sampling an analysis, in order to eliminate the effect of aging of the sample, the losses of the gases for analysis from all bags were measured after the same amount of time had elapsed and the readings were corrected accordingly.

In order to decrease measurement error resulting from instrument drift, before measurements were made the instruments were calibrated with a standard gas in order to assure accuracy and to increase the reliability of the results.

D. Processing of the Data

1. The emission level used for each boiler unit was the mean of the values for the various operating modes that were tested.

2. Because the amount of air leaking into the flow of stack gases increases with distance in the tail section of the boiler unit and the smokestack, if different sampling locations are used, the NO_x volume concentrations in the dry gas obtained from the instruments will vary for the same boiler. The sampling locations for different boilers are different, and the NO_x readings obtained from the instruments will therefore not be comparable. During the survey we concurrently determined the oxygen concentrations in the stack gases and made a uniform conversion to standard conditions and an oxygen concentration of six percent, then calculated the NO_2 concentration by weight.

For different oxygen concentrations, the percentage of NO_x by volume was calculated from the formula

$$C_y = C_x[(21 - y)/(21 - x)] \text{ (percent or mg/liter),}$$

where x is the oxygen content of the stack gas read from the instrument (percent); y is the oxygen content of the stack gas to which the conversion is to be made (percent); C_x is the NO_x concentration read from the instrument (percent or mg/liter); and C_y is the NO_x concentration corresponding to an oxygen content of y (percent or mg/liter).

If the NO_x volume concentration read from the instrument is converted to the standard state, the mass concentration of NO_2 is then obtained by using the following relationship: 1 mg/liter of $\text{NO}_x = 2.05 \text{ mg/m}^3$ of NO_x .

III. Survey Results

We surveyed 51 boilers at 21 power plants around the country. We also included in our analysis data on 8 boilers at 3 power plants that had been surveyed previously. Thus, the total number of boilers was 59, of which 44 were of Chinese design and manufacture; the other 15 were imported from the Soviet Union or Japan. The basic data will be found in Table 1. [not reproduced]

A. Boiler NO_x Emission Levels

Most power plant boilers in China burn coal, and this fuel was the focus of the survey. The measurement results for 54 coal-fired boilers will be found in Table 2. [not reproduced]

As the table shows, the NO_x emission ranges for China's coal-fired power plant boilers are as follows: boilers with solid slag removal, 600-1200 mg/m^3 (unless otherwise noted, the figures have been converted to an oxygen level of 6 percent under standard conditions, with NO_x in the dry stack gas expressed as NO_2), and within this category, direct-flow burners, 600-1000 mg/m^3 , and swirling-flow burners, 1000-1200 mg/m^3 ; boilers with liquid slag removal, 850-1150 mg/m^3 , and within this category, cyclone burners, 1000-1500 mg/m^3 , and boilers burning coal mixed with limestone, 650-950 mg/m^3 .

There are very few boilers using liquid slag removal, and most of them are in small generating units. Boilers with solid slag removal are mostly associated with direct-flow burners, and swirling-flow burners are used on only a small number of generating units. We may therefore assume that the NO_x emission level of China's coal-fired power plant boilers is generally 600-1000 mg/m^3 , and it is evident from Fig. 1 [not reproduced] that most of the values cluster between 700 and 900 mg/m^3 .

B. NO_x Emissions of Oil-Fired Boilers

The five oil-fired boilers that we surveyed were located in Tianjin. Their measured emission levels were 600-760 mg/m^3 , and the nitrogen content of the oil used (N^p) was 0.39 percent. Because all of these boilers used the same grade of oil, the data give no indication of national NO_x emission levels for oil-fired boilers. Measurements made by the Hubei Province Electric Power Institute on oil-fired burners at the Qingshan heat and power station indicate that when the nitrogen content of the oil is 0.889 percent, the NO_x emission levels were respectively 1332 mg/m^3 and 1378 mg/m^3 . Combining the above results, we may conclude that the NO_x emission levels of oil-fired boilers vary with the grade of oil and are between 600 and 1400 mg/m^3 (see Table 2).

C. Comparison with NO_x Emission Levels of Foreign Power Plant Boilers

The emission levels of power plant boilers in Germany and the Soviet Union before control measures were taken will be found in Table 3 [not reproduced].^[3, 4]

It will be seen that the NO_x emissions of China's oil-fired boilers are somewhat higher: in addition to the fact that the fuel oil used in China has a higher nitrogen content, this is the result of poor operating adjustment and excessive air intake. The chamber air excess coefficient of several boiler units in the survey was about 1.2, but it reached 1.3 in a few boilers, matching the level in coal-fired units. The chamber temperature of oil-fired burners is higher, and this fact, in combination with excess air intake, inevitably causes a large increase in NO_x emissions.

The NO_x emissions of boilers in China burning brown coal are largely the same as those in the Soviet Union but are higher than those of units in Germany using brown coal. The reason is that the brown coal-fired units currently in use in China chiefly burn aged brown coal with a relatively low moisture content, with the result that the furnace chamber temperature is somewhat higher than in the German units, which burn brown coal with a higher moisture content. In the case of coal-fired boilers with solid slag removal, the NO_x levels produced by Chinese boilers are generally the same as those for units in the Soviet Union and Germany. The lowest emission level for the Chinese units is somewhat lower than those for the other two countries because the coal used in the Chinese units has a slightly lower nitrogen content.

The NO_x emissions from Chinese power plant burners using liquid slag removal are somewhat lower than the corresponding figures for the USSR and Germany. Because of limited data, our preliminary analysis is confined to the following two conclusions. First, most of the burners with liquid slag removal used in China have open or semi-open furnace chambers, and the direct-flow burners with circle-of-contact combustion, so that the maximum combustion chamber temperature is much lower than in the box-type combustion chambers used in Germany. Second, most of the Chinese burners with liquid slag removal used hot-air pulverized fuel transport, and the fuel-containing tertiary air that is blown into the furnace chamber also performs the function of reducing the NO that has already been formed. NO_x emissions at the Yong'an power plant and Baoji generating plant, with hot-air fuel transport, are lower than the emissions at the Jining generating plant, which uses a direct blast system: the emission level of the former is 850-950 mg/m³ and that of the latter is 1150 mg/m³.

IV. Overall NO_x Emission Levels of All Chinese Power-Plant Burners

We used the survey data and published statistics^[5] to calculate the national total NO_x emissions of all Chinese

power plant boilers in 1987-1989. The calculations made use of the following assumptions and base data.

A. Based on a coal-grade analysis made during the survey, we assumed an average raw-coal caloric content of 22.15 MJ/kg (5300 kcal/kg) and an average crude-oil caloric content of 41.47 MJ/kg (9920 kcal/kg).

B. Based on the survey results, we assumed that the combustion of 1 ton of raw coal and 1 ton of crude oil produced NO_x emissions of respectively 5.6-7.2 kg/ton and 14.5 kg/ton.

C. Coal-fired units were assumed to account for 90 percent of fossil-fired electric power generation and oil-fired units for 10 percent. The increase in electric power output in 1988 and 1989 was assumed to have resulted entirely from coal-fired units.

D. The standard coal consumption for the generation of electric power is 398 g/kWh. The calculation results will be found in Table 4. [not reproduced]

In 1977, the total NO_x output of U.S. combustion units was about 11.60 million tons; fossil-fired generating units accounted for 52 percent of this figure, or about 6.03 million tons. The total NO_x output of China's fossil-fired generating units in 1977 was 20-25 percent as great as U.S. emissions in the same year (China's generating capacity was 22 percent of U.S. capacity). China's electric power production is based primarily on coal-fired units, and in recent years the installed generating capacity and electric energy output have increased rapidly. Calculations indicate that for every increase of 10 billion kWh in fossil-fired electric power output, NO_x emissions increase by 29-38 thousand tons. If steps are not taken quickly, then by the end of the century the annual NO_x output will exceed 3 million tons.

V. Analysis of Survey Results

A. Factors Influencing NO_x Emissions

1. Fuel Type

The power plant boilers covered in the survey burned a variety of fuels, from brown coal to anthracite, and a quality analysis of coal samples from the stations gave the following results. Volatile components (V^y), 3.90-46.77 percent; Total moisture (W^y), 4.50-26.8 percent; Ash (A^y), 10.45-33.52 percent; Caloric content (Q^y_{DW}), 11.29-25.57 percent MJ/kg

The NO_x emission levels for power plant boilers using different varieties of coal are shown in Table 3. As the volatile content of the coal increases, the NO_x emission levels generally decline. The reason may involve boiler design characteristics and burner designs.

When coal grades with low volatile content are burned, the reactivity of the coal is low and the ignition temperature is high. In order to assure timely ignition and stable combustion, most boilers in China use a combustion method in which the primary air is concentrated and

supercharged in order to increase temperature levels in the furnace chamber. When the chamber temperature is high, thermodynamic NO_x generation increases, and as a result, the NO_x emissions of boilers using lean coal are higher than those of boilers fired with bituminous coal or brown coal. Because brown coal has a high moisture and ash content and a low caloric content, boilers designed for it use a relatively low volume heat load, and the furnace chamber temperature is correspondingly lower, with the result that the NO_x emissions are also slightly lower.

2. Nitrogen Content of Fuel

The NO_x in the stack gas from industrial boilers is primarily a product of the oxidation of nitrogen during combustion, and the nitrogen content of the fuel thus has a marked influence on NO_x emissions. The scatter of the measurements for coal-fired boilers is rather large and it is impossible to judge the effect of nitrogen content on NO_x emissions. In contrast, the nitrogen content of fuel oil has a rather clear-cut effect on NO_x emissions. When the nitrogen content of the oil is high, the NO_x emissions increase sharply. The reason for this phenomenon is that the design of the combustion equipment and the operating modes of coal-fired boilers change markedly in response to differences in coal characteristics, thus influencing the NO_x emissions, but in the case of oil-fired burners, the variations in the equipment are small and the operating modes generally differ little, so that the effect of nitrogen content on NO_x emission levels is rather clear-cut.

3. Volume Heat Load of the Boiler

The NO_x emissions of power-plant boilers are influenced by many factors, and their combined effect on on-site measurements must be allowed for. As a result, the data cannot be used to systematize the relationship between the main design characteristics of the boilers and their NO_x emission levels.

The relationship between the boiler volume heat load and NO_x emissions was determined from measurements at the Xigu heat and power plant (three 50,000-kW boilers) and the Yaomeng generating plant (three 300,000-kW units), where every effort was made to exclude the effect of other factors. The six boilers at these two plants are different models, but all use direct-flow burners, a quadrangular layout, and the circle-of-contact combustion method, and all burn the same grade of coal; their NO_x emission levels differ. It is evident from the figure that as the heat load of the boiler increases, the NO_x emissions also rise. This is because when the volume heat load is high, the average furnace chamber temperature is also high.

4. Burner Design

Power-plant boilers in China often use direct-flow burners of quadrangular design and the circle-of-contact combustion method. These burners have the advantages of superior ignition conditions, powerful late-stage

mixing, and a broad adaptability to different coal grades; in addition, they have low NO_x emission levels. Compared with ordinary swirling-flow burners, direct-flow burners have slower early fuel and air mixing, and in the ignition zone the fuel can obtain only a limited amount of air, which is likely to result in the formation of a local oxygen-deficient, fuel-rich zone. Furthermore, because there is good flame fullness, wall flow produces good cooling, so that the temperature field within the furnace chamber is rather uniform, and localized hot spots are not likely to develop.

In the swirling-flow burner, early mixing is intense, with powerful entrainment by the circulating flow, so that oxygen-rich intense hot spots have a tendency to form in the ignition zone. In addition, the shortness of the flame and the concentrated nature of heat emission also promote the formation of hot spots. The result is that NO_x emission levels are somewhat higher.

5. Slag Removal Method

The NO_x emissions of furnaces with liquid slag removal are higher than those of furnaces with solid slag removal. The NO_x emissions of the six furnaces with liquid slag removal included in the survey were between 850 and 1150 mg/m^3 , about 200 mg/m^3 higher than for furnaces of the same volume with solid slag removal. During the survey an optical pyrometer was used to measure the burner temperature, but because the ignition hole placement differed greatly among the furnaces, no transverse comparison can be made. In order to assure a smooth slag flow, furnaces with liquid removal must attain a rather high chamber temperature, which promotes thermodynamic NO_x generation and results in higher NO_x emissions.

Vertical cyclone burners using unmixed coal have NO_x emission levels as high as 1000-1500 mg/m^3 , but when the fuel is mixed with limestone the emission levels drop sharply, to 650-950 mg/m^3 , with is comparable with furnaces with solid slag removal. In macroscopic terms, after the fuel is mixed with limestone, the melting point of the ash is lower, and a smooth flow of slag can be obtained at a much lower furnace temperature. The microscopic mechanism involved still requires further study.

6. Starting and Stopping of Coal Mills

Many power-plant boilers in China use steel ball mills for grinding coal and intermediate-storage pulverized coal preparation systems. The survey found that starting and stopping of the mills had a major effect on the NO_x emissions of hot-blast pulverized coal transport boilers. The NO_x emissions were lowest when the coal mill was constantly in operation and were highest when the mill was stopped for the entire measurement period. In the data from about 10 boilers the range of variation was from about 17 to 25 percent. The range of variation for air-deficient coal transport furnaces was rather small (about 5 percent).

In furnaces using hot-blast pulverized coal transport, the top part of the burner is equipped with a lean-air nozzle. When the mill goes into operation, turning on the tertiary air is equivalent to inducing multilevel combustion; in addition, the tertiary air containing powdered coal can also reduce already-formed NO, thus decreasing NO_x emissions. The survey results indicate that the size of the decrease depends on the position of the tertiary air nozzle and the amount of air. When the nozzle is farther from the main burner, the amount of air is greater, and the decrease in emissions is larger. In furnaces using lean-air pulverized coal transport, turning the coal mill on or off changes only the primary air temperature, and as a consequence, the temperature in the combustion zone changes only slightly; since this change is small, the change in NO_x emissions is also small.

7. Operating Air Blast Volume

Tests in which the air blast volume of several burners was varied indicated that when the total amount of air entering the burner is decreased, the excess oxygen volume declines and the NO_x emissions also decrease somewhat.

In operation with a relatively small volume of air, the combustion process in the furnace is retarded to some degree and there will be large amounts of reducing gas and incompletely burned carbon particles around the flame, so that the intermediate products formed from the nitrogen in the fuel will not obtain sufficient oxygen to undergo oxidation to NO, and in addition, some of the already formed NO will be reduced. But if the operating air volume is too small, then the reducing atmosphere may become locally too concentrated because of scale formation and corrosion on the water-cooled walls; this condition may also lead to an excessively low overheat temperature that endangers operating safety.

If the operating air volume is too small, then the content of combustible material in the flyash and furnace slag may increase; a decrease in the amount of stack gas will also mean that heat losses in it will be smaller. Depending on equipment characteristics and the grade of coal that is used, fine combustion adjustments generally can achieve safe, economical operating conditions in which NO_x emissions are also low. Fig. 6 [not reproduced] shows the results of combustion adjustments on a 60,000-kW generating unit. It will be seen that when the air excess factor in the stack gases is kept between 1.25 and 1.30, not only is operation economical, but NO_x emissions are not excessive.

B. NO_x Emissions of an Imported 300,000-kW Unit Boiler

The two 1025-ton/hour boilers in the first stage of the Shiheng power station in Shandong are imported models produced by the CE company in the United States. They are coupled with a subcritical pressure control cycle steam-jacket boiler designed and built by the Shanghai Boiler Plant. The burner is a multilevel gas injection

low-NO_x straight-flow unit that CE uses widely in large-capacity boilers. In contrast to the conventional bituminous coal-fired straight-flow burners, a two-level ash fan opening is added on top of the integrated burner, and the secondary air, which accounts for about 10-25 percent of the total air volume, enters the furnace chamber through this opening. The combustion process in this burner can be assumed to consist of two stages: in the main combustion zone, the air supply is insufficient, combustion is slow and incomplete, the flame temperature is rather low, and there is an insufficient oxygen supply, so that thermodynamic and fuel-derived NO generation are both decreased. When the high-temperature stack gases rise to the level of the ash fan opening, the incompletely burned combustible materials from the main combustion zone and some of the reducing gases again undergo combustion; because the peak temperature in this zone is lower than that in the main combustion zone, the combustibles are fully burned and the objective of decreasing NO_x emissions is also achieved.

Test results with 17 different combustion adjustments indicate that with bituminous coal whose nitrogen content (N₂) is 1.1 percent, the NO_x emissions are between 570 and 800 mg/m³. In the most economical operating mode, the boiler thermal efficiency reaches 92.4 percent and the NO_x emission level is 610 mg/m³. Because this burner is rather effective in decreasing NO_x emissions, we suggest that it be widely used in new domestically produced generating units.[passage omitted]

The NO_x emission levels of power plant boilers currently being used in China still universally exceed maximum permissible levels. Because of the proliferation of furnace models and the great variability of coal quality, the problems of safe, economical combustion of some low-volatile coal varieties and of high-ash poor-quality bituminous coal still await complete solution. As a consequence, the task of investigating low-NO_x combustion technology in open furnaces is still a major one that will require the unremitting labor of personnel in the fields of combustion technology, power equipment design and manufacture, and power plant operation.

VII. Conclusions and Suggestions

A. The main factors influencing NO_x emission levels are: fuel varieties, boiler design characteristics, burner design, slag removal techniques, models of operation, and the operating air volume. The general patterns are that high NO_x emissions are associated with: high nitrogen content of the fuel; swirling-flow burners as opposed to straight-flow burners; use of liquid slag removal as opposed to solid slag removal; and a large operating air volume. NO_x emissions are lower in boilers fired with brown coal than in those fired with other coal types; and in units with hot-air pulverized coal transport they are lowest when the coal mills are in constant operation.

B. Vigorous research efforts aimed at developing low-NO_x combustion technologies should be undertaken. We

suggest that in future units with capacities of 100,000 kW and above, and particularly in large units imported from abroad, NO_x emission levels should be specified and included among acceptance criteria.

C. Certain industrially developed countries have included large bodies of useful data on NO_x generation mechanisms, the development of low-NO_x combustion technologies and the design of low-NO_x equipment. The multilevel air input burner produced by CE in the United States, which has been imported, significantly decreases NO_x emissions, and its extensive use is recommended.

D. As regards investment, the upgrading of older units should involve primarily improved operating technique and combustion technology; at the same time, energetic efforts should be made to create conditions for the development of new low-NO_x burners. Based on China's experience, there is a need to establish a semi-commercial test facility of suitable scale and to devote appropriate attention to the design of direct-flow low-NO_x units.

Energy Industries To Accelerate Technology Transformation

92WN0440D Beijing ZHONGGUO HUANJING BAO
[CHINA ENVIRONMENTAL NEWS] in Chinese
4 Feb 92 p 1

[Article by Zhong Bian [6988 4882]: "Energy Industries Will Hasten Technical Transformation"]

[Text] China's energy industry will accelerate its technical transformation. Recently, the Ministry of Energy drafted detailed plans for the technological transformation of the coal and electric power industries over the next 4 years.

According to this plan, in the next 4 years, at least a third of all equipment in coal mines currently under central administration will be modernized, and, in addition, high-efficiency, large-size integrated coal-winning equipment with annual capacities of 2-3 million tons will be imported, increasing the degree of mechanization of the centrally administered coal mines from 65 percent in 1990 to 72 percent in 1995, with a saving of about 500 million kWh of electrical energy.

This plan specifies that the technological transformation of the electric power industry must involve the replacement of inefficient medium- and low-pressure generating units by efficient large-capacity units. After the transformation, without increasing the use of coal, the output of electric energy is to be increased by 15 billion kWh each year; ash and slag output are to be decreased by 2 million tons compared with the older generator sets, and carbon dioxide emissions by 5 million tons.

The plan also specifies the main technologies and equipment that the electric power industry must import in the future, including technologies and equipment that

increase combustion efficiency and alleviate environmental pollution; automated power-grid dispatching equipment; large-size wind-powered generating equipment design and manufacturing technologies; and complete sets of technology for the construction of high dams.

State Council Calls for Stepped-Up Recycling of Reusable Resources

92WN0440E Beijing ZHONGGUO HUANJING BAO
[CHINA ENVIRONMENTAL NEWS] in Chinese
15 Feb 92 p 1

[Article by Tian Yuan [3944 0954]: "Strengthen Management of the Recovery and Utilization of Recyclable Resources"]

[Text] The recovery and utilization of recyclable resources is an important measure that supports the aims of development through thrift and hard work, rigorous conservation, rational resource utilization, decreased environmental pollution, and increased economic benefits; the State Council will step up its oversight of this activity.

According to the "State Council Circular on Stepped-Up Management of the Recovery and Utilization of Recyclable Resources," the state is still applying a preferential policy with regard to recyclable resources. Supply and marketing enterprises engaged in the wholesaling or allocation of recyclable resources that have genuine difficulties in paying the wholesaler's tax can continue to request tax exemption from their province, autonomous region, or directly-subordinate municipality tax bureaus; in the case of the net income derived from the recovery and processing of recyclable resources by recycling enterprises of supply and marketing cooperatives and material supply systems that can engage in independent accounting, the relevant provincial, autonomous region or municipality tax administrations may allow special income tax reductions, consistent with their authority, for three years beginning in 1992, with reference to the actual difficulty experienced by the enterprises; and when the above enterprises experience difficulty in payment of taxes on products produced from scrap and waste materials, the tax administrations can appropriately decrease the products tax or value-added tax in accordance with prescribed procedures.

The circular requests that all recovery enterprises act in a spirit of "putting service and social benefits first," overcome and rectify any tendency to overemphasize the large at the expense of the small, to overemphasize the new at the expense of the old, and to overemphasize recovery for the enterprise at the expense of recovery for society, and that, while vigorously procuring scrap metal, they also actively procure other recyclable resources, particularly those which are greatly needed by the production departments but are of low value and yield small profits, or cause severe environmental pollution. The circular also requests that the operations departments

strive to expand the utilization of recyclable resources and that, following the principle of "using before remelting," they organize local category-by-category processing of recyclables and improve the quality of processing. User organizations must overcome the tendency to overemphasize new materials at the expense of scrap materials and must make thorough use of recyclables that can replace new materials.

The circular also includes specific provisions regarding intensified management of scrap metal markets.

Shanxi Province Maps Out Environmental Strategy

92WN0440F Beijing ZHONGGUO HUANJING BAO
[CHINA ENVIRONMENTAL NEWS] in Chinese
25 Feb 92 p 1

[Article by Zhu Shengli [2612 0524 0448], Hu Zao [5170 2483], and Ren Tailong [0117 1132 7893], "Shanxi Province Sets Eight-Character Guideline to Promote Four Measures"]

[Text] How can the new 1-year environmental protection effort play a major role in economic construction? The approach taken in Shanxi Province has been to use the implementation of the State Council decision as the unifying thread and draft the eight-character guideline "implementation, increased thoroughness, service, benefits" for the promotion of genuinely new measures.

Since the change in guiding ideas in 1990, environmental protection measures in Shanxi Province have emphasized conservation of energy and water, comprehensive utilization, and decreased waste and pollution as the key points and have been coordinated with the approach of the planning, economic, science and technology, and finance departments, with the result that environmental protection efforts have progressed smoothly. In 1991, the province's environmental departments issued 53 specific measures for enterprises, set up 69 environmental protection integrated management projects, and closed or otherwise dealt with 240 severe polluters among the "four small" categories of enterprises. Some 140 million yuan in benefits has been realized from comprehensive utilization, environmental quality has been maintained stable throughout the province, and the levels of certain key pollutants are actually showing a downturn.

This year, Shanxi's environmental protection efforts are according full importance to the issuance of practicable programs for coordinated development that are both thorough and broad in scope. The central emphasis has been placed on increased thoroughness of the objectives responsibility system, the quantitative review system, and the pollutant emissions permit system, with a focus on strengthened oversight and effective service, aiming at improved environmental and economic benefits. In the summary formulation, the efforts have concentrated

on "implementation, increased thoroughness, service, and benefits," and four measures have been developed in support of these aims.

- Efforts in legislation and implementation of the laws, performance of the "three-competitions" activities, and promotion of the "three simultaneous" system in connection with environmental protection facilities. This year an effort will be made to get the "Shanxi Province Solid Waste Management Regulations" and the "Shanxi Province Construction-Project Environmental Management Procedures" drafted by the provincial people's congress and the provincial government respectively, and to implement the "Procedures for Management of Pollution Control Facilities." All of the province's enterprises will follow the "three-simultaneous" system, in which environmental facilities will be commissioned simultaneously with the main production facilities, will receive maintenance simultaneously and will be inspected simultaneously with the main production facilities. In addition, prevention and treatment facilities currently in operation will be subject to the "three-competitions" movement, i.e., competition in management, competition in operation, and competition in benefits, in order to gain the maximum benefit from environmental investments and from operation of facilities.

- Clear specification of key objectives. As a result of nearly a year of repeated screening, 150 major polluters in the province have been identified and publicized in the press. The pollutant emissions by these 150 polluters account for 70 percent of the province's total. This year, a movement for removal of the "polluter" label has been formally set in motion. It was begun by requiring 50 of the major polluters to set up spot experiments, which must be fully underway within 4 years; in addition, annual targets for decreasing pollutant emissions were specified as a condition for removal of the "polluter" label, the quotas for utilization rates were increased, and specific measures for removal of the label were set.

- Establishment or improvement of ten key environmental projects, with a guarantee of normal operation by the end of the year. The most important of the ten projects are the Zhaozhuang and Nanyan wastewater treatment plants in Taiyuan and the black-liquor integrated utilization project at the Taiyuan Paper Mill.

- Promotion of scientific and technical progress, stepped-up scientific and technical service, and development of the environmental protection industry. In Shanxi's development of environmental protection science and technology, the areas of emphasis are energy and water conservation and comprehensive utilization, and the focal points are implementing energy conservation, high-efficiency wastewater treatment, recovery and utilization technologies, the dissemination of new, cheap sulfur dioxide and flyash

removal technologies, the development integrated utilization of powdered coal ash and powdered waste-rock utilization technologies, and the dissemination of new technologies for the purification of wastewater from small-scale paper making and small-scale fertilizer production. Effective technical services are to be provided to large and medium-size enterprises, and enterprises are to be given practical assistance in increasing their self-sustaining abilities, with concurrent vigorous development of the environmental protection industry.

Gansu Province Includes Environmental Measures in Development Plans

92WN0440G Beijing ZHONGGUO HUANJING BAO
[CHINA ENVIRONMENTAL NEWS] in Chinese
25 Feb 92 p 2

[Article by Zhao Lide [6392 0500 1795], Chief of Gansu Province Environmental Protection Office: "Incorporating Environmental Protection into the Plans"]

[Text] In order to promote synchronized progress in economic development and environmental development, in recent years, under the serious leadership of the Gansu Province party committee and government, the provincial environmental protection administration and planning commission have coordinated with each other in incorporating environmental protection activities into the provincial 10-year plan for social and economic development, the Eighth 5-Year Plan, and the annual plans, so that environmental efforts have entered the main stream of governmental activity. We have learned several things from this experience.

1. Conscientiously drafting environmental plans is an important precondition for incorporating environmental protection efforts into the province's development plan.

Owing to a long period of development and construction, Gansu has become one of the country's important energy and resource bases, occupying an important position nationally in such industries as nonferrous metallurgy, petrochemistry, electric power, and defense and military engineering, all of which are high-consumption, high-pollution industries. This fact must be taken into account when drafting environmental protection plans.

The main environmental element that Gansu Province has included in the development plans is aggregate environmental protection targets. In general, the aggregate targets are relatively easy to measure, summarize and analyze, they can be related to ongoing statistical work and the "8-items" system, and they are helpful for plan implementation. The specific environmental-protection subject matter incorporated into the plans includes four major parts, comprising a total of 59 aggregate targets and 507 detailed targets. Part 1 consists of a province plan for control of industrial waste disposal and includes 25 aggregate indicators. Part 2 consists of detailed industrial pollutant disposal figures broken down by locality and includes 13 aggregate indicators

and 225 detailed indicators. Part 3 is the industrial pollution control plan for province-level industrial departments, bureaus, or corporations, and includes 13 aggregate indicators and 195 detailed indicators. Part 4 is the environmental quality control plan for the province's main cities and rivers, including 8 aggregate indicators and 87 detailed indicators. In 1992, deadlines for pollution control by long-time pollution sources were added to the province's development plan.

2. Stagewise breakdown and implementation are an important component of environmental-protection plan implementation.

When the environmental plan has been incorporated into the province's development plan and has been formally handed down, only the first step has been taken. It is essential to assure that the plan is broken down and implemented level by level. In this connection, we made thorough use of the existing situation by incorporating the environmental plan into the system of responsibility agreements. We have the relevant province-level heads and the cognizant officials at the prefecture, city and autonomous prefecture levels (i.e., mayors and prefecture chiefs) sign annual environmental-objectives responsibility agreements with the nine province-level industry departments, bureaus or corporations, and in addition, we have the cognizant officials of the above administrative subdivisions and the province-level industrial departments and bureaus sign responsibility agreements with their subordinates at the county, city or district level and at the unit or enterprise level. In this way, the plans are broken down at every level and the environmental-protection objectives and control measures are implemented. Concurrently, our administration drafts and hands down provincewide "integrated annual environmental-protection plans" to serve as auxiliary plans for incorporation into the province-wide plan. These plans are full and specific: they include not only all targets of the specific province-wide environmental plans, but also the detailed breakdowns of all of the main indicators and items, so that the cognizant departments and bureaus of the administrative subdivisions can implement them in detail.

3. Strict oversight and evaluation guarantee completion of assignments.

Gansu Province is now evaluating the implementation of the environmental plans in terms of the performance of the environmental-protection responsibility agreements. To assure that this evaluation is easy to make and is timely and effective, we have worked out and formally handed down the "Gansu Province Management Procedures for Environmental Protection Responsibility Agreements," along with detailed instructions for evaluation, in which we specify the procedures for evaluating attainment of the environmental protection objectives and set forth the criteria for determining rewards and penalties. We have requested that the prefectures, cities and autonomous prefectures and the departments and

bureaus make semiannual reports on the implementation of the environmental plans to the provincial authorities and that they present an annual summary report. At the beginning of the following year, the province environmental protection administration sends out survey teams to the localities and to the departments and bureaus. The evaluation results are formally circulated by the province planning commission and the environmental protection administration, and rewards and penalties are set in accordance with management procedures.

Incorporation of environmental activities into the development plan is just beginning in Gansu, but the experience of slightly more than a year indicates that it is consistent with the province's actual situation and that it has effectively promoted environmental protection efforts. The incorporation of environmental protection work into the plan has promoted a balanced emphasis on both overall and detailed planning and has fostered thorough coordination, so that the national-policy status of environmental protection has been given specific implementation and all branches and industries are jointly pursuing environmental protection efforts rather than leaving them to the environmental protection departments. There has been a changeover from generalized, qualitative management to management in terms of quantitative objectives, which has increased the plan-mindedness and program-mindedness of environmental protection departments and of the other cognizant departments. As a result of the incorporation of environmental protection objectives into plans, they are being treated with greater seriousness by officials at all levels, which is helpful in coordinating the environmental plans with economic management. The new measures also promote the coordination of industrial pollution control with technical modernization, of pollution emission control with comprehensive utilization, conservation and waste prevention, and of regional pollution control with point-source pollution control.

China Faces Serious Agricultural Pollution by Year 2020

92WN0440H Beijing ZHONGGUO KEXUE BAO
[CHINA SCIENCE NEWS] in Chinese 28 Feb 92 p 2

[Article by Xiong Hesheng [3574 0735 3932] and Peng Bin [1756 3453]: "Major Pollution Threats from Agricultural Pesticides, Fertilizers and Plastic Sheeting by Year 2020"]

[Text] At a recent national environmental-program academic exchange conference, it was learned that about 100 million mu of agricultural land is polluted by chemical pesticides, that about 25 million mu is polluted by poor-quality chemical fertilizers, and that the rate of pollution by plastic sheeting is as high as 20 to 30 percent; and this self-caused agricultural pollution is on the rise.

In each of the last 10 years, China has used an average of 2.3 billion mu-applications of chemical pesticides, which have prevented the loss of about 6 percent of total grain output, 10 percent of cotton output, and 20 percent of the output of vegetables and fruits. These are significant figures. But only a small fraction of the pesticides that are applied actually reach their targets; the rest is dispersed, producing agricultural pollution. In 1990, a natural agricultural environmental quality survey organized by the Ministry of Agriculture found that since the state prohibited the production of organochlorine pesticides in 1983, the levels of organochlorine pesticide residues in grain have fallen by an order of magnitude from the 1980's levels, but their effect on the agricultural environment has not been entirely eliminated. The rate of effective application of chemical fertilizers is currently only 30 percent (which is half the rate achieved in advanced farming areas abroad); remainder of the fertilizer passes into the atmosphere or is carried by water into the soil or into rivers and lakes, where it cause eutrophication of water bodies or excess nitrate levels in drinking waters. In addition, because the fertilizer application structure is irrational, some areas use large amounts of chlorine [misprint for "nitrogen"] fertilizers, causing increased nitrate levels in soils and nitrate and nitrite levels in agricultural products. Pollution by poor-quality chemical fertilizers is also growing nationwide. According to statistics, 25 million mu of farmland is polluted by these poor-quality fertilizers. The large-scale use of agricultural plastic sheeting has had a major effect on the physical properties of the soil. Nationally, an average of about 5 kg of sheeting per mu, or up to 43,000 pieces of plastic per mu, is left on the fields, and the national-average pollution rate by plastic sheeting is 20 to 30 percent.

The experts predicted that after the year 2000, as a result of improvements in fertilizer application techniques and integrated preventive measures, in combination with the degradation of pesticide residues in the environment, the overall levels of organochlorine pesticide pollution will decline, and that the residues will have been essentially eliminated by the year 2020. But agricultural pesticides will remain the principal means of controlling disease, insects, and weeds, and their use will be expressed primarily as short growing seasons, rather high pesticide levels in vegetables and fruit, and the unavoidable pollution of surface waters, ground waters, and aquatic life. Technical progress and improved application techniques can raise the fertilizer utilization rate by about 10 percent, but the total amount of fertilizers used will increase markedly, and most of this amount will not be absorbed by plants, but will be dispersed, polluting the environment and crops. In general, fertilizer pollution is likely to have become more serious in 2020, and it will remain one of the serious problems of the ecological environment. The severe shortage of specialized agricultural plastics will not be alleviated soon, and pollution by plastic sheeting is likely to increase as agricultural production expands.

To deal with this situation, the experts stated that we must step up environmental management in the agricultural sector, intensify agricultural environmental legislation efforts, accelerate the creation of an environmental protection manpower pool for agriculture, and conduct research on the efficient utilization of agricultural chemicals.

Ecology-Minded Agriculture Methods on Increase

*OW0605212092 Beijing XINHUA in English
1610 GMT 6 May 92*

[Text] Beijing, May 6 (XINHUA)—China's 800 million farmers are paying increasing attention to ecology in agriculture and are working to make the best use of existing agricultural resources.

Since 1980s, China has conducted extensive experiments on ecology in agriculture, seeking an agricultural development pattern by which land productivity will be raised and the ecological environment be protected at the same time.

According to Professor Qu Geping, director of the State Administration of Environmental Protection, over 2,000 experimental projects at the county, town and village levels have been established throughout the country.

"As a result, a pattern has been formed by which agricultural resources can be comprehensively tapped and rationally utilized while agriculture, forestry, animal husbandry, industry and commerce are being developed," Qu remarked.

China gives particular importance to the scientific use of fertilizers and farm chemicals while also encouraging traditional organic farming.

Since 1985, production of farm chemicals with high toxicants and high residue has been stopped and these chemicals have been subsequently replaced by safer ones, according to Qu.

China has already formulated "green food" standards and has completed the legal procedures for their registration. "Pilot projects are now being undertaken, and technologies for 'green food' production are now being disseminated on state farms," the Chinese official said.

China also pays attention to the selection and use of high-yield and disease-resistant fine strains in the process of agricultural development.

Statistics show that the areas covered by the national programs of biological prevention and treatment of plant diseases and insect pests have increased from 800,000 hectares in 1972 to the present 21.3 million hectares.

In recent decades, China has transformed and comprehensively treated heavily salinated or alkalized soil. "Large areas of formerly arid land in the saline-alkaline regions along the Yellow River and Huaihe River have been transformed into high-yielding fields," Qu said.

Over the last few years, China has also made significant achievements in developing animal husbandry in its vast pasturelands by converting farmland into pastureland, establishing artificial pastureland, reducing rodents and insects, and by controlling desertification.

In recent years, China has implemented a massive afforestation project in its 13 northern provinces and autonomous regions.

Government Stresses Need To Protect Himalaya Environment

*OW1005143792 Beijing XINHUA in English
1415 GMT 10 May 92*

[Text] Kathmandu, May 10 (XINHUA)—The Chinese Government has laid great importance on Himalaya mountain environmental protection, said an official of China's Tibet Autonomous Region.

Former climber Gong Bu, vice-president of the Tibetan Mountaineering Association, said that in order to strengthen the administration of the mountains, an office was set up in 1981 to look after the environment.

Gong Bu attended a three-day meeting of mountain protection commission of the international union of Alpinist association. Delegates from Nepal, Germany, Italy, France, Pakistan, China, Japan and Ireland participated in the meeting which ended here today.

China opened mountain peaks to foreign climbers at the end of 1970s. Gong Bu said the region association cleans the base camps twice a year on Mount Qomolangma, Cho Oyu and Xixabangma where foreign climbers are concentrated.

In autumn, staff members of the association and local residents drive yaks to collect rubbish below 6,500 meters on the world's highest peak Qomolangma and transport them by trucks to the nearest town, Dingri for disposal.

Two toilets and one rubbish pit were built at the base camp of the peak in August 1991 and similar facilities will be installed on Mount Cho Oyu and Xixabangma by the end of next October.

He said a letter printed by the association with requirements for activities in the mountain areas is also given to expedition leader.

The association also hold training courses to the liaison officers on points of attention, including offering expedition assistance and cooperation in rubbish disposal.

About 800 overseas climbers come to Tibet every year, Gong Bu said, a total of 16 expeditions are climbing in the region this spring.

Government Increases Attention to Environmental Impact Assessments

OW1205094792 Beijing XINHUA in English
0856 GMT 12 May 92

[Text] Beijing, May 12 (XINHUA)—The Chinese Government is paying more attention to environmental impact assessments for the country's major construction projects, so as to meet technical standards set by the international financial organizations, such as the World Bank and the Asian Development Bank (ADB).

In the next three years, the World Bank and ADB are expected to provide loans totalling more than 10 billion U.S. dollars to China for its construction projects, and the total investment for the projects will exceed 100 billion yuan, according to a Chinese official from the State Administration of Environmental Protection.

According to the ADB, most of the projects should go through an environmental impact assessment before they get loans from the two banks.

"China has been investing heavily in several development projects and the scale of which is significant at the global level," noted Dr. Surin Setamaint, an executive representative of the ADB, "no doubt that the projects will result in great social and economic development of the country, but they will also impact the environment."

In order to guarantee the utilization of foreign loans and foreign capital going smoothly and the projects to be approved easily, the Chinese environmental scientists and officials are learning the international standards for environmental impact assessment.

Since early this year, the ADB has offered China 600,000 U.S. dollars to run three workshops where 150 senior Chinese environmental scientists and officials from all parts of China and different government departments have been trained in environmental impact assessment studies.

"This kind of training is in line with the policy of the Asian Development Bank which has been doing its best to promote environmental protection and conservation," Dr. Surin remarked, "I am sure China will continue to enjoy this type of technical support from the Asian Development Bank."

According to Zhang Kunmin, deputy chief of the State Administration of Environmental Protection, China now is negotiating with the ADB for another 600,000 U.S. dollars in support for the training of Chinese environmental scientists and officials in its environmental impact assessment program.

Efforts To Protect Ecology in Mining Areas Pay Off

OW1605101592 Beijing XINHUA in English
0715 GMT 16 May 92

[Text] Beijing, May 16 (XINHUA)—China's recent efforts in protecting the environment in and around

mining areas have paid off, greatly slowing the downward trend of environmental pollution in the nation as a whole.

Sources from the Ministry of Geology and Minerals told XINHUA here today that the occurrence of geological disasters and their impact on the environment have been greatly reduced over the past few years.

The impact on ecology and environment by most of the newly built mines is lighter than that of old mines, the sources said, adding that the productivity of some destroyed farmland has been successfully restored, bringing serious pollution under control.

Mineral exploration is a basic industry in China, where the scale of mining ranks third in the world. However, environmental problems caused by mining, such as the ground subsiding, landslides and mud-rock flows, have appeared and created heavy economic losses.

Latest statistics reveal that the increase rate in mining ground subsiding stands at around 100,000 mu (or 6,060 hectares) a year. Of that figure the total farming area occupied or destroyed by the mining industry reaches 20 million to 30 million mu (or 1.33 million to 2 million hectares).

The total economic losses China suffered from natural disasters related with mining top 100 million yuan, the statistics report.

Sources from the ministry cited progress, which they said is appearing full and wide. They said that now many of the 1,000- strong, large- or medium-sized mining areas across the country are conducting related environmental monitoring.

The monitoring is regarded as the first step toward the final establishment of a national geological environmental monitoring network, the sources said, adding that a national data bank on geological disasters in mining areas is to be built by the mid- 1990s.

Sources from the Environmental Division of the ministry said China has already begun to do specific research on the prevention and monitoring methods of chief disasters caused by mining.

These disasters now include land subsiding caused by overflowing pits, landslides and collapses in coal and phosphorus mines, and the pollution caused by sulphur and salt mines.

The building of all major mines in China is proceeded with reports on environmental impact and are affiliated with concrete measures on environmental protection.

The aim, the sources said, is to realize the coordinated and simultaneous development of geological environmental protection and mining.

At the same time, China now requires that research on environmental protection be conducted from the very beginning of prospecting.

Minister of Geology and Minerals, Zhu Xun, said recently, that the geological environment constitutes the foundation of the natural environment and ecology, and therefore, the protection of the former should be the priority in the country's environmental protection.

He said that China has basically realized the coordinated development of mining resources exploration and geological environmental protection.

China set up a National Research Society on Geological Disasters in 1989. It has become a channel for related academic exchanges and studies.

Scientists Share 1992 UN Environmental Prize

OW1805233492 Beijing XINHUA in English
2118 GMT 18 May 92

[Text] United Nations, May 18 (XINHUA)—Two scientists, Professor Qu Geping of China and Professor Yuri Izrael of the Russian Federation, shared the 1992 United Nations Environment Program (UNEP) Sasakawa Environment Prize.

The prize, worth 200,000 U.S. dollars, is acknowledged as the sole United Nations award given annually to individuals or institutions for outstanding contributions to the environment.

This was announced by Francois Giuliani, spokesman for the UN secretary-general, here this afternoon.

The presentation of the award will be made during World Environment Day celebrations on June 6 in Rio, Brazil, during the United Nations Conference on Environment and Development.

According to the prize selection committee, chaired by Dr. Misael Pastrana Borrero, the former president of Colombia, this shared award draws attention to the problems caused by rampant and careless industrialization faced by the newly created Commonwealth of Independent States; and to the challenges of emerging industrialization now being experienced by China.

"We believe that there are great lessons from these examples for the developing world, and other countries, to absorb," Borrero said.

Professor Qu Geping, administrator of China's National Environmental Protection Agency, has been instrumental in putting forward measures that have now checked the trend of environmental degradation in China.

Due to his efforts, more than a hundred environmental standards have been developed and applied, environmental impact studies introduced for new, enlarged or renovated engineering projects, and pollution control facilities integrated into production projects. As a lecturer, broadcaster and publisher of many papers, he has raised the level of environmental awareness throughout the vast territory of China.

Professor Izrael, chairman of the Committee for Hydrometeorology of the former Soviet Union, has devoted many years to the cause of natural environment protection. He visited the Chernobyl site on the second day of the nuclear disaster and measured the radiation situation and the impact of contamination on the natural environment, and subsequently was required to spend four months in hospital.

CAMBODIA

Uncontrolled Logging Threatens Cambodia's Future*BK1305063492 Hong Kong AFP in English 0338 GMT
13 May 92*

[By Andrew Sherry]

[Text] Phnom Penh, May 13 (AFP)—Uncontrolled logging is stripping Cambodia of its forests and its future, warn UN officials pressing for an environmental cease-fire.

The sound of chainsaws has grown louder since October's peace treaty, as the armed factions race to exploit their respective fiefdoms before next year's elections to choose a national government.

A study commissioned for the UN Development Program (UNDP) says regional demand for timber—particularly from Thailand, Vietnam and Japan—could push Cambodia's exports to 1.2 million cubic meters this year, or nearly five times the estimated sustainable level.

Firewood harvesting and slash-and-burn agriculture have left wide areas of Cambodia as "bald as a monk's head," in the words of a Kampot Province resident encountered by the study's authors.

"Forest destruction threatens the productivity of agriculture and fisheries as well, in short, the very sustainability of economic development in Cambodia," the study said.

It said sluice mining of gemstones in western Cambodia was also hurting fishing by sending silt down into the already shallow great lake, the Tonle Sap.

The UN Transitional Authority in Cambodia (UNTAC) sounded an alarm bell over the environmental destruction at a meeting last week of the Supreme National Council (SNC), which groups the four Cambodian factions.

UNTAC deputy chief Behrooz Sadry later told AFP that though UNTAC had no mandate to protect the environment, it would try to reign in abuses through its role overseeing revenue-raising activities of the various factions.

This would mean UNTAC checkpoints on the Thai and Vietnamese borders, now being set up to ensure no foreign troops or weapons are entering Cambodia, would also be used to count truckloads of timber going out.

"We're very concerned about environmental destruction, not only for environmental reasons but also for financial reasons," he said.

"When a new government comes to power it will have no means to support itself," he said.

UNTAC's bid to control natural resource use is likely to face stiff opposition from the Khmer Rouge—who control the gem-mining center Pailin and a wide swath of forest along the western border—as well as from their powerful Thai business partners.

The study estimates the Khmer Rouge will export 200,000 cubic meters of timber to Thailand this year, while the other two resistance factions between them export nearly 180,000 more.

The Phnom Penh Government had by April signed contracts with companies from France, Thailand and Indonesia to export 145,000 cubic metres in 1992 with contracts pending with Singapore, Taiwan and Japanese firms for an additional 175,000.

"Exports by provincial-level authorities and illegal traders are thought to at least equal trade coordinated by central authorities," the study said.

"A 20-kilometer (12-mile) zone along the entire border with Laos is reportedly being logged illegally to ship rosewood and other high-value tropical hardwoods to Thailand," the study said.

"On the Vietnamese border, renegade armed groups were reportedly exporting 2,500-3,000 cubic meters of logs per day into Vietnam in January 1992."

The UNDP study linked deforestation to August 1991 flash floods that caused some 150 million dollars in damage, not counting farmland lost to erosion.

Fishing—the other staple of the Cambodian economy alongside rice farming—has also suffered from the logging of mangrove forests that serve as fish breeding grounds when the Tonle Sap overflows its banks each year.

UNDP program officer Robert Piper said the Cambodian factions needed to observe "an environmental ceasefire" until they agreed on a policy to manage natural resources.

The United Nations has an ally in SNC chairman Prince Norodom Sihanouk, who has emerged as a strong advocate of environmental protection.

"Afforestation is vital for the survival of the Cambodian people," said the prince, who is reportedly considering attending next month's Earth Summit in Brazil.

The study commissioned by UNDP recommends that an environmental advisory team be set up to screen out all foreign investment and aid projects that could harm the environment.

At the same time, a strategy of sustainable economic development should be aggressively promoted with backing from international institutions, it says.

At least 40 percent of Cambodia, or 7.2 million hectares (17.8 million acres) is still covered by forest despite logging, according to figures cited in the UNDP study.

Ironically, some areas were so heavily mined during two decades of war that they should be spared the axe for years to come.

"One of the saving graces of the Cambodian forests is the mines," said Piper.

JAPAN

Government Reacts to Report on Sulfur Oxide From China

OW0905095892 Tokyo KYODO in English 0842 GMT 9 May 92

[Text] Tokyo, May 9 (KYODO)—Sulfur oxide released into the atmosphere in China and blown over Japan's skies is worsening acid rain here, a private research institution said Saturday.

The government responded that it will actively support China and other developing countries on environmental issues.

In terms of sulfur, some 600,000 tons fall on Japan every year, carried either by wind or rain, the General Research Institute of the electric power industry said in a report based on four years of research, started in 1987.

With Japan's cars and factories releasing an estimated 440,000 tons of sulfur a year in the form of exhaust gas or smoke, as of 1986, the report suggested sulfur oxide from China has caused worsening acid rain detected in Japan in recent years.

Moreover, the study found higher levels of sulfur oxide in the rain over areas of Japan facing China across the Sea of Japan than in areas facing the Pacific Ocean.

"The amount of sulfur oxide detected in the rain falling over the area of the Sea of Japan side apparently increased during the winter," probably carried by seasonal winter winds, said a researcher at the institution.

The Ministry of International Trade and Industry (MITI) said the study proved that environmental problems are now a global issue spreading beyond national borders.

The ministry said it will call on China and other nations to work together to protect the environment.

The institute's report, the first definitive quantitative analysis of a Chinese link to Japan's acid rain, seemed to confirm long-held views of experts that big coal-burning power plants along China's Chang Jiang (Yangtze) River were worsening Japan's acid rain.

The findings are results of the institution's research on the relationship between atmospheric sulfur oxide and acid rain at 20 sites across Japan. It conducted the research at the request of the government's Agency of Natural Resources and Energy.

MITI has set up a "green aid" program starting this fiscal year, under which aid is offered for environmental protection projects in developing nations.

Under the program, MITI and the Chinese Government have agreed to jointly develop low-cost desulfurization facilities for electric power plants in China.

Foreign Minister Welcomes Approval of Global Warming Treaty

OW1005073792 Tokyo KYODO in English 0654 GMT 10 May 92

[Text] Tokyo, May 10 (KYODO)—Foreign Minister Michio Watanabe on Sunday welcomed the approval of a treaty to reduce greenhouse gas emissions to prevent global warming.

Watanabe said in a statement, "there may be a view that the method of restrictions on emissions of greenhouse gases is imperfect, but it is very significant that such a framework was built under agreement of countries in the world including advanced and developing countries."

The agreement is also significant in light of next month's earth summit in Rio de Janeiro, Watanabe said.

He said Japan hopes that international efforts to prevent global warming will make great progress in line with the treaty.

The treaty stipulates advanced nations should aim at returning emissions of carbon dioxide and other greenhouse gases to their 1990 level by the end of 1990s.

Government To Ban CFCs in Ship Coolers

OW1105134892 Tokyo KYODO in English 1218 GMT 11 May 92

[Text] Tokyo, May 11 (KYODO)—The Transport Ministry has notified the shipping industry it will ban the installation of ship coolers and freezers using chlorofluorocarbons (CFCs) and halogens, ministry officials said Monday.

The directive will apply to large tankers and passenger vessels constructed after November.

Experts believe the gases contribute to damaging the ozone layer, which shields the earth from harmful ultraviolet rays.

The use of CFCs, mainly as coolants, aerosol propellants, and semiconductor cleaning agents, is to be banned by 2005 under the Montreal Protocol, a pact reached under the auspices of the United Nations Environment Program.

The government is seeking the cooperation of the private sector to reduce demand and supply of the gases to 1986 levels.

The ministry based its directive on a resolution calling for restriction of the gases at a November meeting of the International Maritime Organization in London.

The resolution obligates ships carrying containers with specified types of CFCs and halogens to label them as dangerous starting in July.

MITI Seeks Industry Efforts To Protect Ozone

OW1205134292 Tokyo KYODO in English 1305 GMT 12 May 92

[Text] Tokyo, May 12 (KYODO)—Japan's trade minister asked industries Tuesday to make further efforts to cut production of chemicals that deplete the earth's ozone layer, a ministry official said.

International Trade and Industry [MITI] Minister Kozo Watanabe asked representatives of makers and users of the chemicals to cooperate in attaining the government's target of stopping production of such chemicals as chlorofluorocarbons (CFCs) and trichloroethane by December 31, 1995, the official said.

Watanabe reportedly called it essential to tighten regulations on ozone-depleting substances, as destruction of the ozone layer is spreading faster than previously thought, possibly endangering people and the rest of the ecosystem.

Japan should set an example for the world by taking the initiative in contributions on this issue with advanced technology, as it has contributed to the global economy, he said.

The industry representatives sought flexible regulations during the phaseout period and assistance in introducing alternative technology and substances, according to the MITI official.

While insisting that they have made efforts to cut ozone destroyers, they generally promised further efforts to promote reduction in production and use of the harmful chemicals, the official said.

The MITI official said Japan's CFC production by the end of last year had fallen to 16 percent below the 1986 level, and will drop to 43 percent below the 1986 base level, while trichloroethane output has yet to be brought down to the 1986 level.

The ministry asked major businesses to transfer technologies to smaller companies that would allow them to replace the deadly chemicals with harmless ones, he said.

In that regard, the official said government low-interest loans are available for small and medium-sized enterprises to help finance facilities for common use.

Among the representatives from 72 industrial groups and companies, users included the Japan Automobile Manufacturers Association and the Japan Electrical Manufacturers' Association, while makers included Daikin Industries Ltd. and Kanto Denka Kogyo Co.

Minister Supports LDP Proposal for Environment Ministry

OW1205051192 Tokyo KYODO in English 0303 GMT 12 May 92

[Text] Tokyo, May 12 (KYODO)—Agriculture, Forestry and Fisheries Minister Masami Tanabu on Tuesday said he supports the Liberal Democratic Party's [LDP] tentative plan to establish an environment ministry.

"Environment administration can no longer be conducted by separate sectors. It will be great to set up a ministry which coordinates and controls those activities (among separate government sectors)," he said.

The idea is reportedly being examined by an LDP panel, with the aim of formulating a comprehensive environmental protection law.

Tanabu also told reporters that simple minded opposition to all development projects will not be acceptable in the future.

He said it is now important to establish clear guidelines for development projects and construction plans, under a facility such as an environment ministry, to establish a balance between these interests and those of environmental conservation.

MITI Forms Office To Promote Environmental Protection

OW1205050892 Tokyo KYODO in English 0314 GMT 12 May 92

[Text] Tokyo, May 12 (KYODO)—The Ministry of International Trade and Industry (MITI) set up a special office Tuesday to promote measures to protect the environment and make efficient use of energy.

MITI Minister Kozo Watanabe told reporters after a regular cabinet meeting that the new office will study how to ensure that the nation's industrial and economic structure is built up in a way that does the least damage to the environment.

He said this study will be one of its projects for fiscal 1993, which starts next April. The office will bring together the heads of 17 different departments within MITI.

The move is aimed at pursuing comprehensive policies to balance economic growth and energy consumption with environmental concerns, Watanabe said.

Among issues to be studied by the office will be ways to save energy, thorough reform of the energy demand-and-supply structure to cope with curbs on emissions of carbon dioxide, development of basic technology to protect the environment, and transfer of Japan's technology to developing countries, he said.

Watanabe expressed confidence about overcoming difficulties to make environmental protection compatible with economic growth and with the development of technology in Japan.

"Aggregate measures for economic growth, energy, and the environment as a whole will lead to a thorough solution," he said.

Lobby Calls for Promotion of Environment-Friendly Society

OW1805054192 Tokyo KYODO in English 0531 GMT 18 May 92

[Text] Tokyo, May 18 (KYODO)—An environmental lobby which includes business, industry and consumer groups called Monday for the promotion of a more environmentally friendly society.

The 150-member Japan Committee for Global Environment, which also encompasses academics, members of the press, representatives of local governments, labor unions and environmental groups, issued the call in a declaration.

The main thrust of the declaration is a call for the creation of companies dedicated to environmental preservation.

The committee, which is chaired by Federation of Economic Organizations (Keidanren) Chairman Gaishi Hiraiwa, plans to submit the declaration to the June 3-14 Earth Summit in Rio de Janeiro, Brazil. The Earth Summit is officially known as the United Nations Conference on the Environment and Development.

The committee's adviser and the chairman of the Science Council of Japan, Jiro Kondo, will take the declaration to Rio for presentation at the June 4 "Japan Day" festivities and other functions scheduled in conjunction with the Earth Summit.

The three-part declaration includes a set of general principles for environmental preservation and an action plan for combining the two themes of environment and development.

The section on general principles calls for the promotion of companies and corporations structured to protect the environment, the development of a new environmental logic, the promotion of disarmament and an end to deliberate environmental destruction during military confrontations.

The committee's advisers include former Prime Minister Noboru Takeshita, Rokuro Ishikawa, chairman of the Japan Chamber of Commerce and Industry, and Saburo Okita, a former foreign minister and incumbent chairman of the Japan Branch of the Worldwide Fund for Nature.

In a press release to mark its formation in May 1991, the committee indicated it would work for the "environmentally sound and sustainable" economic development of Japan.

"At the same time, Japanese experience and technology in dealing with many of its severe environmental problems are expected to contribute to improved management of the global environment," the committee said.

Watanabe Expresses Satisfaction Over OECD Meeting

OW1905233792 Tokyo KYODO in English 2312 GMT 19 May 92

[Text] Paris, May 19 (KYODO)—Japanese International Trade and Industry Minister Kozo Watanabe on Tuesday expressed satisfaction over a just-ended ministerial meeting of the Organization for Economic Cooperation and Development (OECD).

Watanabe, meeting reporters after the two-day OECD meeting ended earlier in the day, said the OECD, which groups 24 industrial nations, agreed on the significance of the two themes of trade and the environment and trade and competition for future world trade talks. He also said it was significant that the OECD meeting had agreed on the necessity to develop and transfer environment-related technology to developing countries, prior to the Earth Summit scheduled to be held in Brazil in June.

Japanese Economic Planning Agency head Takeshi Noda, who attended the OECD meeting with Watanabe from Japan, said Japan's economy is expected to pick up from early autumn. Noda also said the world economy is recovering slowly and each country should produce room to lower interest rates by making their finances sound.

Firm Develops Insecticide-Elimination System

OW2005055592 Tokyo KYODO in English 0511 GMT 20 May 92

[Text] Tokyo, May 20 (KYODO)—Major civil engineering firm Hazama Corp. reported Wednesday it has developed a system to remove nitric and phosphoric elements, contained in insecticide and fertilizer, from runoff water at golf courses.

The Tokyo company said the new system involves filtering water through a special tank containing a zeolite substance, to remove the pollutant. The system will help convert the nitric and phosphoric elements into harmless agents by means of the ion exchange effect, the company said.

The company said tests showed that the system was effective in meeting the safety standards for harmful agents set by the Health and Welfare Ministry. The system will cost about 200 million yen for an 18-hole golf course, the company said.

SOUTH KOREA**North, South Likely To Conduct Joint Maritime Environmental Survey***SK1805130492 Seoul KYONGHYANG SINMUN in Korean 16 May 92 p 1*

[Text] It is likely that North and South Korea will conduct a joint survey of actual maritime environmental conditions to preserve the coastal water environment on the Korean peninsula. They will also likely conclude a five-state regional agreement with neighboring CIS members states, China, Japan and others to preserve the maritime environment.

Such a maritime environmental joint preservation project between North and South Korea, the first of its kind, was made possible when North Korea expressed its intention to participate in the North-West Pacific Area Maritime Preservation Plan (NOWPAP), the maritime preservation organ of five countries surrounding the Korean peninsula.

The Ministry of Environment on 15 May reported that North Korea proposed the establishment of a North-West Pacific Research Center in this area and officially informed the United Nations Environment Plan [UNEP], the host organ, that it will dispatch a delegation to the second working-level officials' meeting of the North-West Pacific Area Maritime Preservation Plan to be held in Beijing, China, in September, 1992.

Eftis, a CIS deputy chief who is responsible for UNEP's Kenya-based North-West Pacific Area Maritime Preservation Plan, informed the Ministry of Environment of a diplomatic letter written by North Korea's Bureau of Environment Protection and Land Management. This letter mentioned North Korea's decision to dispatch relevant officials of the Foreign Ministry and Bureau of Environment Protection and Land Management to the Beijing meeting in September. North Korea also proposed the establishment of the North Pacific Research Center to prevent maritime pollution of the East-West coast and to jointly study and cooperate on the maritime environmental conditions.

This letter thanked the UNEP for its report on the results of the first meeting of the North-West Pacific Area Maritime Preservation Plan in which North Korea did not participate. The letter made it clear that North Korea would actively participate in this region's maritime preservation cooperative project and revealed the project's venue would be acceptable in "any appropriate country," thus showing the North's will to actively cooperate for marine preservation.

The upcoming Beijing meeting will work out detailed measures and timetables based on reports by each country on maritime environment, including "The Joint Survey of Maritime Environment," "Technical Cooperation for Prevention of Maritime Pollution and Joint

Efforts To Cope With Pollution Accidents" and the "Conclusion of Maritime Agreement."

A person concerned at the Ministry of Environment said: We have great expectations because we are likely to find out in July North Korea's actual maritime pollution conditions when each country's report, which will be submitted in advance, is distributed among participating countries.

Environmental Violations Increase 83 Percent in 1992*SK1705044692 Seoul THE KOREA TIMES in English 17 May 92 p 3*

[Text] There has been a renewed wave of environmental violations mostly due to industrial companies taking advantage of possible government laxity in inspections with 1992 being an election year.

Statistics at the General Prosecutor's Office showed yesterday that there was a whopping increase of 83 percent in environmental crimes during the first four months of this year over the corresponding period of last year.

As compared to 3,093 persons cited for violating environmental regulations, 5,722 were reprimanded during the cited period, prosecutors said.

"The main reason for the hefty increase in environmental violations is that companies are thinking that authorities are loosening their crackdowns mainly due to the upcoming presidential elections," one prosecutor noted.

Of them, 71 persons were placed under formal arrest, 454 companies told to properly operate their waste treatment facilities and 156 others ordered to suspend their manufacturing activities.

Among the 71 under arrest is Kim Seng-chi, plant manager of the Hanguk Glass Co.'s facility in Yoido, central Seoul, who was charged with illegally incinerating large quantities of industrial waste without due authorization, the prosecutors said.

Earlier in the year, the Environment Ministry vowed to step up environmental inspections on industrial companies to ensure that related facilities are being properly managed and operated.

"There was concern that firms will take advantage of the lax atmosphere created by the campaigning and staging of general and presidential elections to violate environmental regulations.

Another related factor was that the responsibility for conducting the inspections were to be transferred to local authorities which could create a vacuum in the transitional period," environment officials said.

In view of the latest development, the prosecutors vowed to work in cooperation with the ministry to keep a close watch on illegal activities by industrial companies.

They said 56 districts, including the Nam-tong industrial complex in Inchon, east of Seoul, will be designated for special surveillance before the end of next month.

Special task forces will be established at all provincial prosecution offices to lead the crackdown on industrial firms insisting on violating environmental regulations, they added.

THAILAND

New Environmental Protection, Conservation Act Outlined

92WN0493A Bangkok LAK THAI in Thai 2-8 Mar p 4

[Text] The National Legislative Assembly has resolved to pass an Environmental Protection and Conservation Act, featuring 115 clauses. Listed below are the Act's significant features. An Environmental Committee will be established, chaired by the Prime Minister in a capacity of his office. It is empowered to submit to the Cabinet a policy and plan regarding national environmental protection and conservation, to advise the Cabinet on monetary and financial matters including taxes and revenues, to promote investment to keep in line with the policy of establishing environmental funds, etc.

Regarding penalties, fines will be heavy. Whoever causes a spread of pollution that can cause a health hazard will face a maximum sentence of one year imprisonment, or a maximum fine of 100 thousand baht, or both. Whoever spreads false information about sources of pollution with an intent to defame will face a maximum sentence of one year imprisonment, or a maximum fine of 100 thousand baht, or both. Mass media that reports such false information will face a maximum sentence of five year imprisonment, or a maximum fine of 500 thousand baht, or both.

Any entrepreneurs who do not or have no desire to install facilities for processing waste water or waste, or those who do not pipe untreated water and waste to a paid public treatment facility, will face a maximum fine of 100 thousand baht, or a maximum sentence of one year imprisonment, or both. Whoever causes leakage or wide spread of pollution must be penalized in a civil court, that is, he must pay a fine for the damage.

The Act includes clauses in environmental protection, a quality control plan for environment, a designation of a zone for environmental protection and conservation, pollution control and inspection, etc. The Act will become effective 60 days after posted in the Royal Gazette.

Exhaust Emission Control Measures Planned

92WN0493C Bangkok NAE0 NA in Thai 12 Apr 92 p 3

[Text] Sources from the Office of Industrial Product Standards (OIPS) reported that OIPS will announce general standards on exhaust emission for diesel engine cars, unleaded benzene cars, and motorcycles by September 1992. The regulation will then become mandatory within two years after OIPS can obtain and install a device for exhaust emission test.

The standards for exhaust emission of engines will set a limit to the quantity of carbon monoxide, hydrocarbon, and nitrogen oxide emission of engines. This first phase of general standards will become mandatory after the two year waiting period, which will allow the Ministry of Industry to conduct a bid for a testing device called a chassis dynamometer, which is valued at about 100 million baht and will take a year after the bid to manufacture. It will be installed at the Bang Pu Industrial Sector.

A chassis dynamometer, mounting on a revolving axle, will simulate streets similar to those in Thailand. Its computer screen will display a car test result, detailing a value of each mixture emitted. At present some large-sized car manufacturers have already ordered a chassis dynamometer.

Sources reported that the Committee for Economic Screening restricts OIPS to announce only standards for exhaust emission, but not standards for catalytic converters. The reason is that to do so would limit car manufacture technology. The Committee for Economic Screening urges OIPS to announce standards for car exhaust emission at once. Once the regulation becomes mandatory, the Ministry of Industry can nullify the announcement which requires new cars assembled domestically to be equipped with catalytic converters.

Prime Minister Cites Environmental Goals in Policy Statement

BK0205123192 Bangkok NAE0 NA in Thai 1 May 92 pp 3,5

["Policy Statement of the Cabinet of Prime Minister General Suchinda Khrapayun To Be Delivered to the Parliament [on 6 May]"—NAEO NA headline]

[Text] Your Excellency The President, and distinguished members of the parliament:

In accordance with the royal decree dated 7 April 1992 appointing me prime minister, and the royal decree dated 17 April 1992 appointing the Cabinet ministers, the Cabinet has formulated a policy for national administration and would like to present it to the honorable members of parliament to inform them of the government's policy objectives for national administration. I would like to say that the policy has been formulated with a view to enhancing economic, social, and political

stability for the well-being of the country and the people. The details of the policy are as follows:

1. Political Policy

The government is determined to develop and achieve a strong political system so as to benefit the entire nation. People of all sectors and from all walks of life will be encouraged to participate in the administrative system within the framework of the Constitution and monarchical democratic system. Following are the policies:

(1) The government will uphold the monarchy with the highest esteem and will preserve the institutions of the nation, religion, monarchy, and monarchical democratic system.

(2) The government will develop the political party system and its role as a principal mechanism in the development of the monarchical democratic system. It will create a sense of responsibility among the Thai public within the context of the Constitution. It will promote wider public participation in politics at the national and local levels.

(3) Decentralization of administrative power to the provinces and rural areas will be carried out systematically and in accordance with the realities of each locality. The government will accelerate development of personnel management and budgetary allocations in keeping with the above decentralization plan.

(4) The government will support and promote freedom of information for the mass media so that news reports will be fast and accurate.

2. Policy on Bureaucratic Administration and Legal Reforms

The government is determined to switch from control to a supervisory system for bureaucratic administration which will support and contribute to efforts for national development. Its policies are as follows:

(1) Carry out bureaucratic reforms as follows:

(1.1) Adjust the attitude of administrative officials so they are open to views and opinions from the general public, and so they perform their duties with a sense of dedication and sacrifice for the well-being of the general public.

(1.2) Improve bureaucratic administration with a view to boosting efficiency for service to the public, cutting red tape, and promoting smoothness. Decentralize administrative power and responsibilities to junior authorities and eliminate duplication of work. Adjust the formality concerning approvals and authorization to be granted by authorities or government agencies by formulating clear-cut guidelines, regulations, frameworks, and timeframes for them to make the decisions. The public or concerned parties must be informed in advance of criteria and timeframes for administrative decisions. Also, improve the structure and steps pertaining to

administrative decisions on personnel management, budget management, and coordination of work plans so as to achieve smooth and efficient results.

(1.3) Improve policies and planning by ministries and departments so policies are clear-cut and match the government's stated policies and the national development plan. There must be follow-up, acceleration, and evaluation of official projects carried out.

(1.4) Encourage government and state enterprise services to expand to the provinces and rural areas. They are also encouraged to make use of modern technologies, including data and information systems, in order to promote efficient public service in contributing to government responsibilities and the needs of the people.

(1.5) The government will give moral strength and encouragement to officials through the improvement of compensation and benefits in keeping with their status and the cost of living; provide them with an appropriate welfare system and standard working atmosphere; and adhere to the merit system in giving rewards and promotions. This is aimed at securing and keeping competent officials in the administration.

(1.6) Take effective measures to prevent malpractice and corruption in government circles. Take stringent punitive action against wrongdoers.

(1.7) Reorganize judicial work to increase its efficiency, placing emphasis on speedy administration of justice. Set up more courts.

(1.8) Improve and modernize laws in conformity with socioeconomic developments to ensure social justice and bring them into conformity with bureaucratic reforms, with a shift from a control to supervisory system. Support relevant research projects by educational institutions and academics, and encourage suggestions from the general public.

3. Policy on Development Distribution and Creation of Social Justice

The government intends to develop the rural areas in order to earnestly distribute income and resolve poverty. Its policy is as follows:

(1) Rural Development

(1.1) The purpose is to broaden and accelerate service to the people.

(1.2) Decentralize the administrative power and budget management so the provinces will have a role in initiating provincial development projects that suit the needs and wishes of the local people.

(1.3) Encourage the localities to generate more income by developing their capabilities in income collection, improving the local tax structure, and distributing more state income to the rural areas.

(1.4) Develop the capability of the tambon councils, enabling them to become an effective organ for assisting the people and thus lay the foundation for them to be transformed into juristic bodies when ready.

(1.5) Accelerate development of supplemental occupations which could be performed during and outside of the cultivation season in order to increase farmers' income.

(1.6) Provide appropriate technological and marketing services to enable the rural people to produce quality products and sell them easily at fair prices.

(1.7) Accelerate expansion of infrastructure services, such as roads, electricity, consumption water sources, and basic healthcare, in order to improve the standard and quality of life of the rural people.

(1.8) Promote credits to be used by farmers in non-agricultural fields.

(1.9) Provide land for landless farmers through land reform or other means and accelerate issuance of land ownership documents for people who have not secured ownership documents so they can have the rights to their land.

(1.10) Improve the land distribution methods for social justice and for the purpose of preventing hardships to the people, particularly those who are already earning a living on their land.

(2) Community Development for Urban Low-Income Earners

(2.1) Develop shelters for urban low-income earners, including in the health and utility services, to appropriate standards.

(2.2) Encourage and cooperate with the private sector to provide skilled labor training in the fields facing shortages in order to give workers occupational choices. Increase their income by allocating budgets to support occupational training, and provide health care and education services to them.

4. The Natural Resources and Environment Policy

The government has the following policy of conserving and rehabilitating natural resources and developing the quality of the environment:

(1) Conservation and rehabilitation of natural resources

(1.1) Conserve natural resources and safeguard against their destruction, whether the resource is land, forests, or something else, by strictly using legal authority. Give the local people a greater role in natural resource conservation.

(1.2) Rationally protect natural resources to simultaneously generate economic, recreation, and conservation benefits.

(1.3) Create a consciousness among the people, particularly the youth, concerning the importance of conservation and development of natural resources and urge their participation.

(2) Conservation and Development of Water Resources

(2.1) Solve shortages of water resources by making available water storage places and natural or newly-created artificial storage places, in every region and river area, while at the same time minding the ecological and watershed systems. Also promote the role of the local organizations in maintenance of such resources.

(2.2) Cooperate with the neighboring countries in development of water resources for the common benefit of the region.

(2.3) Promote the private sector playing a greater role in supplying water for industrial use.

(2.4) Collect fees that are appropriate to the investment cost and that encourage saving for use of water in non-agriculture-related activities.

(3) Conservation and development of forest resources

(3.1) Attach importance to conservation of reserve forests and watersheds by ensuring that officials concerned exercise strict controls and use modern technology, such as satellite photography. Quickly create more national forests and wildlife conservation zones in appropriate areas.

(3.2) Conduct surveys in order to rapidly separate reserve forests and economic forests and make beneficial and realistic use of survey results.

(3.3) Encourage forest planting by farmers in order to increase the forest acreage, particularly in the areas surrounding water sources.

(3.4) Promote forest planting by the private sector for economic benefits and more shaded areas.

(3.5) Conserve and rehabilitate mangrove forests and prevent encroachments upon them.

(4) Development of energy-related natural resources

(4.1) Accelerate the survey, production, and sufficient procurement of suitable energy sources while at the same time campaigning for energy and environmental conservation.

(4.2) Cooperate with the neighboring countries to develop natural resources and energy sources for the mutual benefit of the region.

(5) Solution of the pollution and environmental problems

(5.1) Accelerate the tackling of the environmental problems that endanger the people's health, particularly water, air, and noise pollution, and the disposal of waste from industrial plants, communities, and hospitals.

Business establishments that contaminate the environment will be financially responsible for solutions to such problems.

(5.2) Protect against dangers from toxic and dangerous materials by improving controlling systems, ranging from their transport to storage and disposal. Also ensure that the relevant laws are strictly obeyed.

(5.3) Create in the people the awareness of danger from pollution and environmental problems. Promote the role of communities and private development organizations in solving the problem with the public sector.

5. The Agricultural Development Policy

Being aware that farmers make up the majority of the population and that they are mostly poor and face high production costs, due to inferior technology, as well as uncertain income from their products, it is the government's policy to make the agricultural policy the basic strategy in national development. It will pay attention to and devise measures to revive the agricultural sector on a continual and effective basis, as follows:

(1) Production policy

(1.1) Encourage farmers to improve the production structure, including cultivation, animal raising, and fishing to suit the local conditions and market demands.

(1.2) Attach importance to soil improvement as the major policy in agricultural development by emphasizing the state's role in investment in nonorganic soil development.

(1.3) Make investments to support research and development in natural methods of insect eradication. Promote transfer of such technology to farmers so they will avoid sole dependence on chemicals.

(1.4) Encourage farmers to use plant species that give high yields and have high resistance to insects and diseases. As necessary, in a timely manner supply to farmers production implements, including plant and animal breeds. Provide information necessary for production and marketing.

(1.5) Emphasize extension of long-term credits to farmers so they can revive their agricultural system efficiently and broadly. Encourage the Bank for Agriculture to relax conditions in giving credits to small-scale and poor farmers.

(1.6) Put more funds into the land fund to enable landless farmers to own land. There is a goal to convert the land fund to a land bank.

(2) Marketing policy

(2.1) Develop the domestic produce market to give farmers more chance to bypass middlemen by setting up central markets broadly at the local level.

(2.2) Ensure that farmers receive fair prices in the sale of their products by price intervention or other suitable measures.

(2.3) Support groupings of farmers to strengthen their bargaining power and their desired activities.

(2.4) Enlarge the fund for assistance to farmers and ensure that the use of the fund directly benefits farmers.

(3) Income promoting policy

(3.1) Expand the agriculture industries to receive raw agricultural products that will help farmers have more choice in what to produce. Provide sufficient guarantees for prices and places to sell by encouraging the establishment of processed produce plants in the local areas in accordance with market demand.

(3.2) Provide farmers with more choices in their occupations in order to increase their income and enable them to have jobs year-round and earn income from the use of their land.

(3.3) Encourage farmers to make use of their land in various agricultural ways to increase their income.

6. Economic Policy

The government adheres to a free economic system and stresses maintaining financial and monetary stability and discipline. This main goal is coupled with distribution of income, creation of social justice, and development of quality of life and maintenance of the environment. It will also attach importance to accelerating the country's capability to compete with other countries to enable the economy to expand on a continued basis. It intends to make Thailand the region's economic center. The policy is as follows:

(1) Conduct the financial policy carefully to prevent inflation, which will affect national development and people's living standards.

(2) Improve the capability of the state organizations and the private sector in the economic system so they will be ready to adapt to compete in the new environment in a reasonable time.

(3) Adjust the country's economic system to give it immunity and the capability to expand, and systematically and stage-by-stage attach itself to the international economic system to enable it to develop and truly compete with other countries, within the framework of financial and monetary discipline.

(4) Accelerate development of the domestic savings capability to conform with the demand for funds for development within the framework of economic and financial changes in the world, particularly development of the country into a regional financial and business center, by developing the capital and financial markets to standard and enabling them to effectively satisfy the

government and the private sector's capital demands. Depositors and investors will truly be protected.

(5) Adjust or change the government and local tax structure and collection methods for clarity, fairness, and efficiency in order to increase the revenue of the central and local governments.

(6) The obstruction and limitation by state enterprises of expanding utility services will be eliminated to provide the quantity and quality needed to firmly support the country's economic expansion.

(7) Promote Thai businessmen to expand their investment and business abroad.

(8) Carry out the financial and monetary policy and measures to provide incentives for environmental preservation, solutions to pollution, economical use of energy, conservation of natural resources, and expansion of Thai business abroad by developing the packing credit system and protecting Thai investment abroad.

(9) Improve the tax structure for the greatest national benefit within the framework of GATT and AFTA while at the same time ensuring that local industries are not negatively affected by the action.

(10) The government will perform the following in the industrial field:

(10.1) Expand industries to the regional areas by supplying necessary infrastructure and providing conveniences and promotional privileges to attract investment by the private sector. In particular, emphasis will be given to industries that use agricultural and local raw products.

(10.2) Promote Thai industries so they will have the capability to compete with other countries in terms of quality and production cost.

(11) In the commerce and service sectors:

(11.1) Reduce steps, rules, and regulations to enable private citizens to operate businesses more conveniently and efficiently.

(11.2) Enhance the role of the insurance institutes in broadly mobilizing funds for national development.

(11.3) Accelerate expansion of exports by increasing the exporters' capability and competitive ability in every way, such as by reducing production cost, protecting their trading interests, and safeguarding the national interest in multilateral trade negotiations, as well as by exploring regular and new markets such as in the Middle East, Eastern Europe, and the neighboring countries.

(12) In the communications and transport sectors:

(12.1) Speed up the creation of basic infrastructure in the communications and transport sectors so it will contribute to fast economic development and completion of the attempt to make Thailand the regional financial and

business center. Carry out new projects to make the transport and communications sectors lead and spur economic development. In particular, accelerate removing the obstacles to national economic development, such as the delay in construction of main highways and road networks in the rural areas.

(12.2) Speed up solution of the traffic problem and other problems in Bangkok and on its outskirts, as well as in the regional cities by solving the traffic, mass transit, road expansion, and road surface problems and by enforcing good discipline of road users. In particular, in Bangkok and the outskirts, complete plans and projects will be made and financial support given to the concerned agencies.

(12.3) Accelerate development of commercial airports to support expansion of air transport and tourism so the country will become the regional air transport center.

(13) Promote and develop the tourism industry by providing conveniences and safety to tourists while preserving tourist spots and local culture to attract tourists.

7. National Defense Policy

The Government has the following national defense policy:

(1) Improve and develop the Armed Forces so their size will be appropriate and so they will be efficient, combat-ready, and modern. Improve their reserve and mobilization systems to benefit national development and protect national interests and consolidate the national defense forces by incorporating the military, paramilitary, and popular forces to maintain stability as well as protect national resources.

(2) Develop a self-reliant capability in national defense by supporting and promoting military research and development as well as the production of military equipment in the country by cooperating with government agencies, the private sector, and friendly countries.

(3) Support and promote the role of the Armed Forces in national development, security development, assistance to the people, and disaster relief. Improve the morale of the soldiers and their families through welfare and subsistence aid, and assist war veterans and their families so they can live satisfactorily and honorably.

8. Social Policy

The government has the following social policy:

(1) Promote stability and safety of life and property for the people by accelerating the prevention and suppression of all types of crime and influential groups, especially against persons who engage in illegal logging and in economic crimes both in the center and localities. Resolutely prevent and suppress production and trafficking of narcotics.

(2) Support the development of society and intellectual development at the village level. Emphasize the use of morality as a guideline in life and promote religious teachings. Promote the use of religious teachings of communities as a guideline in developing society and promoting intellectual development in line with the local culture.

(3) Look after the well-being of aged people so they will be able to live happily in society.

(4) Look after, rehabilitate, and develop indigent people and groups of people who have special problems, such as the crippled and disabled, to enable them to receive education and vocational training so they can be independent honorably, and promote the position and role of women.

(5) Develop and protect women in order to prevent them from being exploited and oppressed.

(6) Develop the quality of life of the children and youth by creating recreational and sports facilities. Provide training in good attitudes for them.

(7) Attach importance to the conservation and preservation of national arts and cultural heritage along with economic development.

(8) Strengthen the consumer protection system by having guarantees that will be really fair to both manufacturers and consumers.

(9) Organize a natural disaster prevention system so that it will be ready to handle such incidents in a timely manner. Support the role of the public and private sectors in joint disaster prevention.

(10) Provide legal assistance to the people and employ modern technology in the consideration of lawsuits in courts, and develop and expand the probation system. Improve the consideration of lawsuits so lawsuits can be handled quickly and effectively.

(11) The government has the following sports policy:

(11.1) Pay attention to the promotion of sports so it can be a basis for improving the quality of life of the people as well as improving the health of the people. Accelerate the improvement of sports systematically and build up sufficient sports stadiums to meet the people's demands. Emphasize the development of a high standard in sports so sportsmen will have the same ability in competitions as those from other countries.

(11.2) Support the private sector's role in promoting and developing sports by adopting measures to create incentives for the private sector to assist and support all kinds of sports.

(11.3) Strengthen the welfare and morale of the sportsmen, which will be the incentive for them to train and play at their best.

(11.4) Encourage educational institutions to emphasize health promotion activities and exercises for children and youth so they will have good health and have capability in sports competitions at the national and international levels.

9. Education Policy

The Government will attach importance to human resources development in national development. It will improve the education system, courses, and educational institutions in order to enable educators to profoundly understand the value of being a human being and improve the quality of the people. It will carry out the following measures:

(1) Promote and expand education opportunities for education inside and outside schools in order to raise the compulsory education to junior high school level and to expand the pre-school education in rural areas to a greater extent.

(2) Adopt measures to solve the shortage of qualified teachers by improving regulations in order to allow the private sector to take part in arranging high school, vocational, and university education at a broader range as well as to mobilize the resources of both the public and private sectors from inside and outside the country to solve problems.

(3) Accelerate the training of sufficient numbers of qualified personnel in the technological and vocational fields in order to solve the labor shortage problem.

(4) Support research and development works to improve the efficiency and progress of technology that will be suitable for national development in order to reduce dependence on foreign technology in the future as well as to promote import of foreign technology for modification to suit the environmental conditions of the country.

(5) Improve educational courses so they will have suitable technological, art, cultural, and traditional contents that will be suitable to local conditions. Increase the knowledge of people through the mass media.

(6) Strengthen the welfare and morality for teachers in the center and localities so they will have security in their jobs, especially those at remote areas.

(7) Promote the distribution of educational opportunities at the university level to meet the policy of spreading prosperity to regional and rural areas.

10. Public Health Policy

The government attaches significance to the development of public health and the quality of life of the people and will make efforts to thoroughly expand public health services to effectively serve the people. The government adopts the following public health policy:

(1) Emphasize the development of medical and public health services. Improve the quality of services at all

levels. Maintain operational readiness of medical personnel in times of peace and emergency. Expedite the improvement of health service at the tambon level and development of a national public health service network comprising service units of government agencies, ministries, departments, and private sectors so every person can have equal access to good and effective medical care.

(2) Urgently implement a policy of AIDS control and prevention; provide treatment for AIDS patients to enable them and carriers to live normal lives in society; encourage state, private, and charity organizations to make continuous contributions to the control and prevention of AIDS; and propagate knowledge in this regard in a cautious manner to avoid jeopardizing the country's tourism industry.

(3) Accelerate the development of health insurance programs for low-income earners, including the aged.

(4) Develop an effective support system to facilitate the exportation of food and medical products.

(5) Accelerate the consumer protection work to ensure fair prices and good quality of food and medical products and public health services.

11. Labor Policy

The government will implement the policy of promoting self-improvement for workers so they can choose their occupations in line with the desire and ability of each individual, thus further heightening their income and quality of life. The government will take the following actions:

(1) Support the operation of the tripartite wage committee comprising representatives of employees, employers, and the government in regulating minimum wages.

(2) Promote the role of the Advisory Council for National Labor Development in monitoring and solving workers' problems.

(3) Expedite the efforts to secure full payment and welfare benefits as prescribed by law and occupational security for workers in all sectors.

(4) Encourage workers, especially those in rural areas, to upgrade their skills and abilities so they can choose the occupations that suit their skills and abilities to increase their earning.

(5) Organize the information system and improve the efficiency of rural labor market mechanisms.

(6) Give protection to Thai workers abroad so as to prevent them from being cheated and exploited. Work out measures to reduce the costs for Thai workers to go to work abroad. Defend the interests, safety, and rights of Thai workers abroad.

(7) Secure full legal protection and fair treatment for women and children in the labor market and unskilled laborers.

(8) Improve the social welfare system so those under the social welfare scheme are entitled to quick and effective compensation.

12. Foreign Policy

The government will implement an independent foreign policy in conformity with developments in the world situation and the current status of the country in the best interests of the country and Thai people on the basis of equality, respect for each other's independence, sovereignty, and territorial integrity, and non-interference in internal affairs. The government continues to honor the existing obligations under the agreements and treaties Thailand has concluded with all countries, as well as the UN Charter and International Declaration of Human Rights, and to enhance cooperation with all countries and the United Nations in promoting and safeguarding peace, stability, socioeconomic progress, and in preserving the environment so as to upgrade the quality of life of the people. The government has adopted the following foreign policy:

(1) Promote harmony and cooperation with the neighboring countries in Southeast Asia, especially economic, trade, and social ties including regional communications for the benefit of peace, stability, and prosperity in the region.

(2) Strengthen close relations and cooperation in the political, economic, social, and cultural areas with ASEAN member countries with emphasis on the economic grouping.

(3) Develop and improve economic, trade, investment, and tourism relations with major trading partner countries. Promote economic and trade relations with countries in all regions through close coordination between the state and private sectors.

(4) Promote both bilateral and multilateral cooperation in the economic, technical, cultural, and human resource development areas with all countries. Enhance Thailand's role in assisting and supporting economic development in developing countries—in particular, national reconstruction now underway in the neighboring countries—through economic, technical, and social cooperation, which will further strengthen relations and good understanding with the latter.

(5) Enhance Thailand's roles in the international community within the framework of the United Nations and other international organizations in defending peace and maintaining the free and fair trading system, as well as in environmental preservation and development.

(6) Defend the legitimate rights and interests of Thai citizens abroad and secure fair treatment for them.

(7) Promote Thailand's good image through continuous public relations endeavors so as to enable all countries to gain correct impressions and knowledge on Thailand and Thai culture. Use cultural relations to foster friendship at both government and grass-roots levels with all countries.

13. Science and Technology Policy

The government adopts a policy of accelerating development of the country's scientific and technological potential through cooperation with the private sector so as to promote socioeconomic development and increase the country's international competitiveness. The government will take the following actions:

(1) Expeditiously train personnel in the scientific and technological areas, both in terms of quantity and quality.

(2) Support scientific and technological research and development work in Thailand to achieve acceptable quality and standards and make continuous efforts to further develop science and technology.

(3) Support the application of technologies that are not detrimental to the environment and that promote research work and the development of such technologies.

(4) Promote cooperation with foreign countries in exchanging knowledge in science and technology as a recipient of such knowledge from more advanced countries and as a provider for less-developed countries.

14. Urgent Policies

To provide assistance for the people who are suffering from drought and to cushion the impact of the problem in the future, the government will take the following actions:

(1) Water will be distributed and water pumps sent to help the people in the drought-stricken areas.

(2) Farmers will be encouraged to independently solve the drought problem through the provision of loans with compromise rates of interest.

(3) Government agencies concerned will be instructed to urgently develop artesian water sources to solve the drought problem for the time being and in the long run.

(4) Rainmaking teams will be sent to the areas where conditions are favorable for rainmaking, for example the areas above dams, water reservoirs, and farming areas.

(5) Government agencies concerned will be instructed to urgently dredge canals and water ponds so they can be used for water storage.

(6) Compromise terms will be worked out for debt repayment for farmers who are affected by drought and loans will be provided with low interest rates for them to resume their farming.

(7) Rural job creation schemes will be accelerated, especially in the drought-plagued areas, to generate more income for the people.

Respected National Assembly chairman and distinguished members of the parliament: I hereby pledge that the government will strictly, faithfully, and honestly implement the presented policies for administration of the country to secure the maximum benefit for the people and prosperity for the country. All actions will be carried out openly and in a fair manner. I firmly believe that the government, with cooperation from distinguished members of the parliament, will be able to fulfill the policies for the interests and well-being of the majority of the people. Thank you.

BULGARIA

Legal Standards for Atmospheric Emissions Issued

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in Bulgarian No 81, 1 Oct 91 pp 4-11

[Standards for Allowable Emissions (Concentrations in Waste Gases) of Harmful Substances Released Into the Atmosphere, issued by the Ministry of Environment and signed by Minister D. Vodenicharov; coordinated with the Ministry of Public Health by letter No. 04-09-9 of 13 May 1991]

[Text]

Ministry of Environment

Standards for Allowable Emissions (Concentrations in Waste Gases) of Harmful Substances Released Into the Atmosphere

Article 1. (1) The standards for allowable emissions shall apply to existing production processes and activities as well as to the planning and erection of new industrial and other facilities that are emission sources.

(2) The standards for new facilities shall apply to the renovation and modernization of production processes in current operation.

Article 2. (1) In the research study and workup of projects, apart from the observance of these standards, the investor and designer must make clear for each specific facility the air pollution in the region of the site and provide for measures (degree of purification and dispersal height) so that, on completion of the project, the air content of harmful substances at the breathing level shall not exceed the maximum allowable concentrations (emissions).

(2) Regardless of the calculations, the height of the production facility's stack must exceed by at least 5 m the highest inhabited building situated within a 50 m radius of it.

(3) When the facility is situated on open unbuilt-up terrain (asphalt bases, crushing and screening installations and other production processes), stack height must be at least 12 m above the terrain elevation unless the calculations require a greater height.

(4) In the planning of new facilities the investor and designer must be guided by the breakthroughs and state of the art in equipment and technologies at the time of the research study and ensure any possible lower emissions than the standards set by this document.

Article 3. The quantity of production and ventilation gases and the content of harmful substances therein shall be reduced to standard conditions (760 mm Hg and °C) and dry gas. Everywhere in this text, the standards in

mg/cu m and quantities of gases in cu m shall be understood under these conditions.

Article 4. (1) The standards shall apply to production and ventilation gases measured after the purification plants, the gas producer plant, or before the stack without their being diluted by fresh air.

(2) For processes and activities not indicated in Articles 20-38, the quantity of gases in cu m/h and the measured concentrations of harmful substances therein shall be determined under the following conditions:

1. For processes in which fuel systems are used, the measured concentrations shall be reduced to the oxygen content in volume percents:

- a) Production of asphalt mixtures—17 percent;
- b) Glass production—8 percent in the case of continuous-process crucible and bath furnaces and 13 percent in the case of periodically operating (daytime) furnaces;
- c) Direct drying of products and materials with hot gases produced in a combustion chamber—17 percent;
- d) Melting of mineral matter like basalt, slags, and so forth—8 percent;
- e) Heating of metals for rolling and other working—5 percent;
- f) Production of expanded perlite, schists, or clays—14 percent;
- g) Burning of wood and vegetable wastes, paper, straw—11 percent;
- h) Burning of white liquor from the production of paper pulp—5 percent;

2. The emissions with gases from technological processes shall be determined in relation to the composition and quantity thereof, after the final technological apparatus from which they are conducted to the purifier or are released into the atmosphere. When for technological reasons or for considerations of safety dilution with fresh air is necessitated or penetration of air through a duct to the purifier is possible, the measured concentrations after purification are to be regarded as one and the same as the quantity after the production line. For this purpose, the oxygen content after the production line and after purification is measured, and, on the basis of the results, the emission shall be recalculated excluding the extra air that has been introduced.

(3) When the measured oxygen content differs from that set for the process in question or is larger owing to dilution of the gases, the measured emission is corrected by multiplying it times coefficient K, determined according to the formula

$$K = 21 - O_n / 21 - O_i$$

Key: O_n = norma, "standard"; O_i = izmereno, "measured."

where:

O_n is the oxygen content in volume percent for the process in question or at the exit from the production line;

O_i is the measured oxygen content in volume percent after the purifier or before release of the gases into the atmosphere.

Article 5. The measurement of the emissions shall be made during normal operation of the production and under a load of 70 to 100 percent.

Article 6. For substances that may be found in the gases in a varying state of aggregation (particles, vapor and gas), the standards shall refer to the total content thereof.

Article 7. The total emission of dustlike substances as per Article 13, Paragraph 1 shall include nontoxic dust and the dustlike substances contained therein as per Articles 14 and 18, the content of which must not exceed the values set for the class in question.

Article 8. Everywhere in these standards the emission of sulfur oxides shall be the sum total of sulfur dioxide and sulfur trioxide, defined as sulfur dioxide, while the emission of nitrogen oxides shall be the sum total of nitrogen dioxide and nitrogen oxide, defined as nitrogen dioxide.

Article 9. By capacity of a production line (multistation machine system), fuel system, and so forth shall be understood the rated output per hour of a specified unit or group of units included in a common stack. The capacity of fuel systems shall be determined by the calorific value of the quantity of fuel fed under a rated load.

Article 10. The standards for facilities put into operation before the end of 1992 shall be in force until 31 December 1995. During this period, economic supervisors must take measures to reduce the emissions to the values set for new facilities.

Article 11. "Mass flow" per hour is the quantity in kilograms or grams of a given substance that is released with the gases into the atmosphere per hour.

Article 12. The measurement of emissions by monitoring authorities and other organizations shall be made in accordance with methodologies prescribed by the BDS [Bulgarian State Standards] and, when there is no Bulgarian State Standard, in accordance with methodologies approved by the minister of environment.

Article 13. (1) The total emission of dustlike substances must not exceed the following:

1. For facilities put into operation before the end of 1992 with a gas yield as follows:

a) Up to and including 20 xm^3/h —300 mg/cu m;

b) From 21 to 100 xm^3/h —200 mg/cu m;

c) Over 100 xm^3/h —150 mg/cu m;

2. For new facilities put into operation after 1992 with a gas yield as follows:

a) Up to and including 20 xm^3/h —150 mg/cu m;

b) From 21 to 60 xm^3/h —130 mg/cu m;

c) Over 60 xm^3/h —80 mg/cu m.

(2) The emission of soot, regardless of the quantity of gases, must not exceed 50 mg/cu m.

Article 14. (1) The emissions of dustlike inorganic substances, indicated in Appendix No. 1, must not exceed the following values:

1. Substances from class I:

a) For facilities put into operation before the end of 1992 with a mass flow of 0.1 g/h or more—0.2 mg/cu m;

b) For new facilities with a mass flow of 1 g/h or more—1 mg/cu m;

2. Substances from class II:

a) For facilities put into operation before the end of 1992 with a mass flow of 1 kg/h or more—5 mg/cu m;

b) For new facilities with a mass flow of 5 g/h or more—1 mg/cu m;

3. Substances from class III:

a) For facilities put into operation before the end of 1992 with a mass flow of 3 kg/h or more—15 mg/cu m;

b) For new facilities with a mass flow of 25 g/h or more—5 mg/cu m.

(2) If several substances of the selfsame class are present, the total emission thereof must not exceed the standard set for the class in question.

(3) Present substances from different classes, the emission of each of them must not exceed the standard for the respective class; the total emission, present substances from classes I and II, must not exceed the standard for class II, while, present substances from classes I and II, II and III, or I, II and III, it must not exceed the standard for class III.

Article 15. (1) Limitation of emissions during the processing, production, and conveyance of dust-producing materials:

1. Devices and equipment for the processing (e.g., crushing, sorting, mixing, pelletizing, briquette making, and so forth) or production of dust-producing materials must be encapsulated, while dust-containing gases must be caught and conducted to the dust separator;

2. For the conveyance of dust-producing materials, enclosed equipment must be used—conveyor belts, screw conveyors, redlers, pneumatic conveyors, and so forth. When encapsulation is partially impossible, the dust-containing gases are caught and conducted to the purification plant;

3. In loading and unloading dust-producing materials, vacuum-cleaning and dust-collecting equipment must be placed as follows:

a) At permanent loading and unloading points with grab buckets, shovel loaders, and so forth;

b) At the initial tube (spout) of the loading systems;

c) For expander systems, at the beginning of the pneumatic conveyor and at the mechanical unloader;

4. When suction (collection) of dusty air is not possible, for these operations (for example, the loading of railroad cars and trucks), spouts with variable heights (telescope spouts) are used and regulating valves are placed on the spout outlets in order to reduce the velocity of the material coming out, and so forth;

5. In filling enclosed spaces (grain elevators, cement trucks, and so forth), the air coming out of them is caught (collected) and conducted to the purification plant;

6. Loading and unloading sites and transport communications must be paved with asphalt or other equivalent covering and be kept constantly clean.

(2) To reduce emissions during the storage or deposit of dust-producing materials, the following measures must be applied:

1. Storage in grain elevators;

2. Covering and enclosure of all sides of storage places and of the auxiliary equipment servicing the storage place;

3. Covering the surface of the stored material with a tarpaulin, and so forth;

4. Enclosure of the deposited material;

5. Protection of the depot with embankments, the planting of windbreaks, or the placement of windbreak fences;

6. Keeping the surface of the depot constantly moistened.

Article 16. The emissions of inorganic gaseous and vaporous substances, indicated in Appendix No. 2, must not exceed the following values:

1. Substances from class I:

a) For facilities put into operation before the end of 1992 with a mass flow of 100 g/h or more—3 mg/cu m;

b) For new facilities of a mass flow of 10 g/h or more—1 mg/cu m;

2. Substances from class II:

a) For facilities put into operation before the end of 1992 with a mass flow of 150 g/h or more—15 mg/cu m;

b) For new facilities with a mass flow of 50 g/h or more—5 mg/cu m;

3. Substances from class III:

a) For facilities put into operation before the end of 1992 with a mass flow of 1000 g/h or more—100 mg/cu m;

b) For new facilities with a mass flow of 300 g/h or more—30 mg/cu m.

4. Substances from class IV:

a) For facilities put into operation before the end of 1992 with a mass flow of 10 kg/h or more—1000 mg/cu m;

b) For new facilities with a mass flow of 5 kg/h or more—500 mg/cu m.

Article 17. (1) The emissions of organic substances, indicated in Appendix No. 3, must not exceed the following values:

1. Substances from class I:

a) For facilities put into operation before the end of 1992 with a mass flow of 0.1 kg/h or more—20 mg/cu m;

b) For new facilities with a mass flow of 0.1 kg/h or more—20 mg/cu m;

2. Substances from class II:

a) For facilities put into operation before the end of 1992 with a mass flow of 3 kg/h or more—150 mg/cu m;

b) For new facilities with a mass flow of 2 kg or more—100 mg/cu m;

3. Substances from class III:

a) For facilities put into operation before the end of 1992 with a mass flow of 6 kg/h—300 mg/cu;

b) For new facilities with a mass flow of 3 kg/h or more—200 mg/cu m.

(2) Present organic substances from various classes in the gases with a mass flow of 3 kg/h or more, the total emission identified as hydrocarbons must not exceed 200 mg/cu m, and 300 mg/cu m for enterprises put into operation before the end of 1992.

(3) In the case of installations from which intensely odoriferous substances (organic and inorganic) may be released, measures such as encapsulation, operation under vacuum-gauge pressure, and so forth must be

taken, and the gases must be caught and led off for purification (deodorization). When the olfactory number exceeds 100,000, purification (deodorization) must be over 99 percent.

Article 18. (1) The emission of substances with delayed genotoxic effects must not exceed the following values:

1. Class I:

- a) Asbestos as fine dust;
- b) Benz (a) pyrene;
- c) Beryllium and compounds thereof identified as beryllium;
- d) Dibenz (a, h) anthracene;
- e) 2-Naphthylamine: With a mass flow of 0.5 g/h or more, the emission must not exceed 0.1 mg/cu m;

2. Class II:

- a) Arsenic trioxide and arsenic pentoxide, arsenic acid and salts thereof, identified as arsenic;
- b) Chromium hexavalent and compounds thereof (for example, calcium chromate), chromium trivalent, strontium chromate and zinc chromate, identified as chromium;
- c) Cobalt—aerosols and difficultly soluble cobalt salts, identified as cobalt;
- d) 3,3-Dichlorobenzidine;
- e) Dimethyl sulfate;
- f) Ethyleneimine;
- g) Nickel, nickel sulfide, nickel oxide, nickel carbonate, identified as nickel; with a mass flow of 5 g/h or more, the emission must not exceed 1 mg/cu m;

3. Class III:

- a) Acrylonitrile;
- b) Benzene;
- c) 1,3-butadiene;
- d) Epichlorohydrin;
- e) 1,2-Dibromoethane;
- f) 1,2-Epoxypropane;
- g) Ethylene oxide;
- h) Hydrazine;
- i) Vinyl chloride: With a mass flow of 25 g/h, the emission must not exceed 5 mg/cu m.

(2) Present substances from classes I and II, the total emission must not exceed 1 mg/cu m, and present classes I and III, II and III, or I, II, and III, must not exceed 5

mg/cu m, while, for each separate substance, the standard for its respective class must be observed.

Article 19. Allowable surface load on outdoor areas of harmful substances deposited (precipitated) on the earth's surface—arithmetic mean value per year:

- 1. Total dust—350 mg/sq m in a 24-hour period;
- 2. Lead and inorganic compounds thereof in deposited dust, identified as lead—0.25 mg/sq m in a 24-hour period;
- 3. Cadmium and inorganic compounds thereof in deposited dust, identified as cadmium—0.005 mg/sq m in a 24-hour period;
- 4. Thallium and inorganic compounds thereof in deposited dust, identified as thallium—0.01 mg/sq m in a 24-hour period;
- 5. Hydrogen fluoride and gaseous inorganic fluorine compounds in deposited dust, identified as fluorine—0.001 mg/sq m in a 24-hour period;
- 6. Zinc in deposited dust—0.4 mg/sq m in a 24-hour period.

Article 20. (1) The gas emissions from power-generating and heating boilers with thermal capacity over 50 MW must not exceed the values in mg/cu m given in Appendix No. 4.

(2) The emissions in combustion processes with thermal capacity from 5 to 50 MW inclusive in mg/cu m must not exceed the values given in Appendix No. 5.

(3) The emissions in combustion processes with thermal capacity from 500 kW to 5 MW in mg/cu m must not exceed the values indicated in Appendix No. 6.

(4) The standards shall apply to the oxygen content of the smoky gases as per Paragraphs 1 and 2:

- 1. For grate burning—7-volume percent;
- 2. For powder burning and dry removal of ashes—6-volume percent;
- 3. For powder and wet slag removal—5-volume percent;
- 4. For liquid fuels—3-volume percent;
- 5. For gaseous fuels—3-volume percent.

Article 21. Cement production:

- 1. Dust emissions—as per Article 13, Paragraph 1;
- 2. The emission of nitrogen oxides from clinker furnaces must not exceed 1500 mg/cu m;
- 3. The emission of sulfur oxides from clinker furnaces must not exceed 750 mg/cu m;

4. The emissions with the gases from the clinker furnaces are for an oxygen content of 9-volume percent.

Article 22. Production of pottery and materials from clay:

1. The emissions are to be determined for an 18-volume-percent oxygen content of the gas;
2. Dust emissions are to be determined in accordance with Article 13, Paragraph 1;
3. Given a sulfur content of 0.12-volume percent or more of the constituent raw materials, the emission of sulfur oxides for a mass flow of 10 kg/h or more must not exceed 1500 mg/cu m.

Article 23. Roasting of dolomite, gypsum, limestone, bauxite, kieselguhr, magnesite, quartzite, and fireclay:

1. Dust emissions as per Article 13, Paragraph 1, but when the raw materials contain chromium, the emissions of chromium and of compounds thereof, identified as chromium, must not exceed 10 mg/cu m;
2. The emission of nitrogen oxides must not exceed, as follows:
 - a) For rotary furnaces—1800 mg/cu m;
 - b) For other furnaces—1500 mg/cu m;
3. The emission of inorganic fluorine compounds, identified as hydrogen fluoride, must not exceed 10 mg/cu m;
4. The emissions are for a 9-volume-percent oxygen content of the gases.

Article 24. Nonferrous-metal-producing installations:

1. Dust emissions of currently operating enterprises shall, until the end of 1993, be limited to 40 mg/cu m, but, for new enterprises and those operating after 1993, they shall be limited to 20 mg/cu m, except for the production of lead, the emission of which shall be limited to 10 mg/cu m;
2. The emission of sulfur oxides for currently operating enterprises shall, up to the end of 1995, be limited to 3,000 mg/cu m, but, for new enterprises and those operating after 1995 with a mass flow of 5 kg/h or more, it shall be limited to 800 mg/cu m.

Article 25. Pig iron, steel, and ferroalloy production and foundry activities:

1. Dust—Dust concentration in waste gases from the heating plants must not exceed 30 mg/cu m, and, for nonferrous metals, 20 mg/cu m;
2. Organic compounds in foundry processes—The concentration of organic compounds in the gases must not exceed the standards set in Article 17, and, for amines, must not exceed 5 mg/cu m;

3. Dust emissions in sand drying and other processes for preparation or processing of founder's mixtures and the cleaning of castings—as per Article 13, Paragraph 1.

Article 26. Aluminum melting:

1. Dust emissions, given a mass flow of 0.5 kg/h or more, must not exceed 20 mg/cu m;
2. The emission of chlorine with the gases in the refining of aluminum must not exceed 3 mg/cu m;
3. The emission of organic compounds, identified generally as hydrocarbons, must not exceed 50 mg/cu m.

Article 27. Production of lead storage batteries:

1. Dust emissions, with a mass flow of 5 g/h or more, must not exceed 0.5 mg/cu m;
2. The concentration of sulfuric acid in the gases must not exceed 1 mg/cu m.

Article 28. Production and packaging of plant protectants—Dust emissions, given a mass flow of 25 g/h or more, must not exceed 5 mg/cu m.

Article 29. Production of sulfur dioxide, sulfur trioxide, sulfuric acid, and oleum:

1. The emission of sulfur dioxide must not exceed 2.6 kg per ton of 100-percent sulfuric acid produced;
2. The emission of sulfur trioxide must not exceed, as follows:
 - a) For installations currently in operation—0.6 kg per ton of sulfuric acid;
 - b) For new installations—120 mg/cu m.

Article 30. Production of sulfur products with use of the Claus process:

1. The emission of sulfur compounds, identified as sulfur, as a weight percent of the quantity of sulfur manufactured per day, must not exceed, as follows:
 - a) Up to 20 tons per day inclusive—3 percent;
 - b) From 21 to 50 tons per day inclusive—2 percent;
 - c) Over 50 tons per day—0.5 percent.

2. After combustion of the waste gas or after other treatment, the emission of hydrogen sulfide must not exceed 10 mg/cu m.

Article 31. Production of 1,2-dichloroethane and vinyl chloride—The emission of 1,2-dichloroethane, as well as that of vinyl chloride must not exceed 5 mg/cu m.

Article 32. Production of polyvinyl chloride (PVC)—The emission of vinyl chloride must be maximally limited and, on average per month, must not exceed 200 mg per kilogram of polyvinyl chloride produced.

Article 33. Production of polyacrylonitrile:

1. When the process gases are combustible, the emission of acrylonitrile must not exceed 0.2 mg/cu m;
2. When the process gases are treated by scrubbing, the emission of acrylonitrile must not exceed 5 mg/cu m.

Article 34. Petroleum refining and production of petroleum products:**1. Fuel systems:**

a) The emission of sulfur oxides shall be determined according to the formula

$$E = E_g T_g/T_o + E_t T_t/T_o,$$

Key to Cyrillic subscripts:

g = gaz, "gas"; t = techni (gorivi), "liquid (fuels)";
o = obshto, "total"

where:

E_g is the boundary value in gas combustion—35 mg/cu m;

E_t is the boundary value for liquid fuels: for thermal capacity up to 300 MW—1,700 mg/cu m; for thermal capacity over 2-0 MW—400 mg/cu m;

T_g is the thermal capacity of the quantity of gaseous fuel fed per hour;

T_t is the thermal capacity of the quantity of liquid fuel fed per hour;

T_o is the sum of T_g and T_t ;

b) The emission of nitrogen oxides must not exceed 300 mg/cu m for new installations, but, for installations put into operation before the end of 1992, it must not exceed 700 mg/cu m;

c) The emissions apply for a 3-volume-percent oxygen content of the gases;

2. Depots for petroleum and petroleum products:

a) Petroleum and petroleum products that at a temperature of 20° C have a vapor pressure over 13 mbar must be stored in tanks with floating covers or tanks with immobile covers that are connected with the enterprise's gas system;

b) The gases from the breathing of the tanks with immobile covers must be conducted into the enterprise's gas system when the stored products may emit substances from class I under Article 17 and from any class under Article 18, or when the expected emissions exceed the mass flows given for the other classes under Article 17;

3. Other emission sources:

a) The emitted organic gases and vapors must be caught and conducted into the enterprise's gas system, from which they pass on for burning, to a flare or for other treatment. These requirements apply to: safety (safety valves) and drainage equipment; regeneration of catalysts; repair and cleaning of installations; startup and stopping of production lines; filling up of crude oil and intermediate and final petroleum products that, at a temperature of 20° C, has a vapor pressure over 13 mbar;

b) Emission of hydrogen sulfide—The gases from desulfurizing installations and other sources are to be treated when the hydrogen sulfide content by volume exceeds 0.4 percent and the mass flow of hydrogen sulfide is more than 2 tons/24-hour period. The emission of the treated and untreated gases must not exceed 10 mg/cu m.

c) Treatment of process and ballast waters: Process and ballast waters before being discharged into open systems shall be degasified with the resultant gases drawn off for treatment or burning.

Article 35. Production of wooden surfaces:**1. Dust emission must not exceed:**

a) After polishing machines—10 mg/cu m;

b) After drying—50 mg/cu m.

2. The emission of vaporous and gaseous substances of class I under Article 17—in gases after the presses must not exceed 0.12 kg/cm of surfaces produced.

Article 36. Painting and varnishing of machines, metals and other products:

1. The gases from the painting chambers must not contain more particles (varnish particles) than 3 mg/cu m. For these gases, the requirements under Article 17—classes I and III—do not apply;

2. The emission of organic substances in the gases from the drying chambers, identified generally as hydrocarbons, must not exceed 50 mg/cu m.

Article 37. Installations for the application of coatings and the stamping of textiles with organic dyes, lacquers, and synthetic materials:

1. Dust emissions must not exceed 5 mg/cu m during spray application and 15 mg/cu m during the pulverization of powders;

2. The emission of organic compounds, identified generally as hydrocarbons, during the use of more than 10 kg/h of solvents must not exceed 150 mg/cu m;

3. When up to 25 percent of water and ethanol are used as a solvent, the emission of ethanol must not exceed 500 mg/cu m;

4. The emission of organic compounds with the gases from the drying installations, generally identified as hydrocarbons, must not exceed 50 mg/cu m.

Article 38. Waste-gas treatment installations: Concentrations of harmful substances in the gases released from the installations in which solid household wastes and other wastes are used for fuel must not exceed the values in mg/cu m indicated in Appendix No. 7.

Article 39. When emissions of harmful substances not indicated in these standards are expected from certain processes and activities, the interested juridical and

natural persons shall make an investigation and submit to the Ministry of Environment for approval emission standards for specific cases.

Final Standards

Section 1. The standards are issued on the basis of Article 4, Paragraph 3 of the Regulations on the Application of the Law for Protection of the Air, Water, and Soil against Pollution (published in DURZHAVEN VESTNIK No. 80/1964, changed and supplemented in No. 9/1978), and rescind Order No. 1 on Allowable Content of Harmful Substances in the Gases Released Into the Atmosphere (DURZHAVEN VESTNIK No. 7/1986).

Section 2. The standards were coordinated with the Ministry of Public Health by letter No. 04-09-9 of 13 May 1991.

Appendix No. 1 to Article 14, Paragraph 1

Serial No.	Substance	Identified as	Class
1	2	3	4
1.	Antimony and compounds thereof	Sb	III
2.	Arsenic and compounds thereof	As	II
3.	Vanadium and compounds thereof	V	III
4.	Mercury and compounds thereof	Hg	I
5.	Cadmium and compounds thereof	Cd	I
6.	Cobalt and compounds thereof	Co	II
7.	Tin and compounds thereof	Sn	III
8.	Copper and compounds thereof	Cu	III
9.	Manganese and compounds thereof	Mn	III
10.	Nickel and compounds thereof	Ni	II
11.	Lead and compounds thereof	Pb	III
12.	Palladium and compounds thereof	Pd	III
13.	Platinum and compounds thereof	Pt	III
14.	Quartz powder, fine <5 µm	SiO ₂	III
15.	Rhodium and compounds thereof	Rh	III
16.	Selenium and compounds thereof	Se	II
17.	Tellurium and compounds thereof	Te	II
18.	Thallium and compounds thereof	Tl	I
19.	Fluorides	F ₂	III
20.	Chromium and compounds thereof	Cr	III
21.	Cyanides, readily soluble	CN	III

Appendix No. 2 to Article 16

Serial No.	Substance	Identified as	Class
1.	Ammonia	NH ₃	III
2.	Arsenic hydride	AsH ₃	I
3.	Nitrogen oxides (nitrogen oxide and nitrogen dioxide)	NO ₂	IV
4.	Bromine and vaporous and gaseous compounds thereof	HBr	II

Appendix No. 2 to Article 16 (Continued)

Serial No.	Substance	Identified as	Class
5.	Sulfur oxides (sulfur dioxide and sulfur trioxide)	SO ₂	IV
6.	Hydrogen sulfide	H ₂ S	II
7.	Fluorine and vaporous and gaseous compounds thereof	HF	II
8.	Phosgene	COCl ₂	I
9.	Phosphine	PH ₃	I
10.	Chlorine	Cl ₂	II
11.	Cyanogen chloride	CICN	I
12.	Chlorine compounds, vaporous and gaseous inorganic	HCl	II
13.	Hydrogen cyanide	HCN	II
14.	Aerosols of sulfuric acid	H ₂ SO ₄	II

Appendix No. 3 to Article 17, Paragraph 1—Organic Substances

Serial No.	Name	Chemical Formula	Class
1	2	3	4
1.	Acetaldehyde	C ₂ H ₄ O	I
2.	Acetone	C ₃ H ₆ O	III
3.	Acrylic acid	C ₃ H ₄ O ₂	I
4.	Alkyl alcohols		III
5.	Aniline	C ₆ H ₇ N	I
6.	Vinyl acetate	C ₄ H ₆ O ₂	II
7.	Butyl acetate	C ₆ H ₁₂ O ₂	III
8.	Dibutyl ether	C ₈ H ₁₈ O	III
9.	Dichlorodifluoromethane	CCl ₂ F ₂	III
10.	1,1-Dichloroethane	CH ₃ Cl ₂	II
11.	1,2-Dichloroethane	CH ₂ Cl ₂	I
12.	Diethylamine	C ₄ H ₁₁ N	I
13.	Dimethylamine	C ₂ H ₇ N	I
14.	Diethyl phthalate	C ₂₄ H ₃₈ O ₄	II
15.	Ethanol	C ₂ H ₅ OH	III
16.	Ethyl acetate	C ₄ H ₈ O ₂	III
17.	Ethylamine	C ₂ H ₇ N	I
18.	Ethylbenzene	C ₈ H ₁₀	II
19.	Ethylene glycol	C ₂ H ₆ O ₂	III
20.	Isopropylbenzene	C ₉ H ₁₀	II
21.	Cresol	C ₇ H ₈ O	I
22.	Xylenes	C ₈ H ₁₀	II
23.	Formic acid	CH ₂ O ₂	I
24.	Maleic anhydride	C ₂ H ₂ O ₃	I
25.	Mercaptans		I
26.	Methanol	CH ₃ OH	III
27.	Methyl acetate	C ₃ H ₆ O ₂	II
28.	Methyl acrylate	C ₄ H ₆ O ₂	I

Appendix No. 3 to Article 17, Paragraph 1—Organic Substances (Continued)

Serial No.	Name	Chemical Formula	Class
29.	Methylamine	CH ₅ N	I
30.	Naphthalene	C ₁₀ H ₈	II
31.	Nitrobenzene	C ₆ H ₅ NO ₂	I
32.	Nitrotoluene	C ₇ H ₇ NO ₂	I
33.	Acetic acid	C ₂ H ₄ O ₂	II
34.	Olefinic hydrocarbons (less 1,3-butadiene)		III
35.	Paraffin hydrocarbons (less methane)		III
36.	Perchloroethylene	CCl ₂ CHCl	II
37.	Propynoic acid	C ₃ H ₆ O ₂	II
38.	Pyridine	C ₅ H ₅ N	I
39.	Carbon disulfide	CS ₂	II
40.	Styrene	C ₈ H ₈	II
41.	Carbon tetrachloride	CCl ₄	I
42.	Toluene	C ₇ H ₈	II
43.	Trichloroethylene	C ₂ HCl ₃	II
44.	Phenol	C ₆ H ₆ O	I
45.	Formaldehyde	CH ₂ O	I
46.	Phthalic anhydride	C ₈ H ₄ O ₃	I
47.	Furfural	C ₄ H ₃ OCHO	I
48.	Fine sawdust <10 µm		I
49.	Chlorobenzene	C ₆ H ₅ Cl	II
50.	Ethyl chloride	C ₂ H ₅ Cl	III
51.	Methyl chloride	CH ₃ Cl	I
52.	Chloroform	CHCl ₃	I

Appendix No. 4 to Article 20, Paragraph 1

Serial No.	Type of Fuel	Facilities Put Into Operation Up to and Including 1992				New Facilities			
		Dust	Sulfur Oxides	Nitrogen Oxides	Carbon Monoxide	Dust	Sulfur Oxides	Nitrogen Oxides	Carbon Monoxide
1.	Bulgarian coal	200	3,500	1,000	250	100	650	600	250
2.	Imported coal	150	2,000	1,300	250	80	650	600	250
3.	Liquid fuels	50	1,700	700	170	50	650	450	170
4.	Gaseous fuels	10	—	500	100	10	—	300	100

Appendix No. 5 to Article 20, Paragraph 2

Serial No.	Type of Fuel	Dust	Sulfur Oxides	Nitrogen Oxides	Carbon Monoxide
1.	Solid fuels	120	2,000	500	250
2.	Liquid fuels	50	1,000	450	170
3.	Gaseous fuels	10	—	200	100

Appendix 6 to Article 20, Paragraph 3

Serial No.	Type of Fuel	Dust	Sulfur Oxides	Nitrogen Oxides	Carbon Monoxide
1.	Solid fuels	150	2,000	500	400
2.	Liquid fuels	80	1,000	450	170
3.	Gaseous fuels	—	—	200	100

The standards apply given a 12-volume-percent oxygen content of the smoky gases.

Appendix No. 7 to Article 18

Serial No.	Indicator	Installations Burning Up to 750 g/h of Wastes	Installations Burning Over 750 kg/h of Wastes
1.	Dusty substances	100	30
2.	Gaseous substances		
a)	Hydrogen chloride, identified as chlorine	100	50
b)	Hydrogen fluoride, identified as fluorine	4	2
c)	Sulfur oxides	—	300
d)	Carbon monoxide	100	100
3.	Dusty substances and aerosols		
a)	Lead, zinc, chromium, copper, manganese, including compounds thereof—together	—	5
b)	Arsenic, cobalt, nickel and compounds thereof—together	—	1
c)	Cadmium and soluble compounds thereof	—	0.2
d)	Mercury and compounds thereof	—	0.2
4.	Dioxines (2, 3, 7, 8-tetrachlorodibenzodioxines)	0.1 ng/m ³	0.1 ng/m ³
5.	Organic compounds, identified generally as hydrocarbons	20	20

The norms apply given an 11-volume-percent oxygen content of the smoky gases.

HUNGARY

Toxic Waste Remains Problem Despite Publicity

92CH0538A Budapest NEPSZABADSAG in Hungarian
17 Apr 92 p 7

[Article by Erika Kiss: "Collective Amnesia in Jaszbereny? Hazardous Waste Still in the Ground"]

[Text] Ever since parliamentary representative Dr. Zoltan Kis laid the facts before the public, the press brought news regularly on the environmental pollution of Jaszbereny's Lehel Refrigerator Factory [LRF]. Since 1990, NEPSZABADSAG has also published several reports on the events. But the mountains of hazardous waste are still waiting to be removed.

Now, at the request of Electrolux, the Swedish owner, a new plan has been worked out by Martech, an American firm. If everything goes well, the plan will be carried out soon. But the people living in the polluted area are hardly satisfied. Indeed, they are really angry now. They

are looking for those responsible for the environmental damages, are demanding compensation, and are requesting that their wells be examined and cleaned. And the bill goes to the State Property Agency [AVU].

Seven Dump Sites

The things leading up to the events include the fact that in 1990—in part because of political pressure—LRF mapped out the locations where it illegally deposited hazardous waste for approximately 20 years. This involves an area of about 10 to 12 square kilometers west of Jaszbereny, where seven such dumping areas have been identified. The Zagyva River, full of life, flows by the vicinity, in an environmentally protected area! An estimated 1,000 barrels containing paint sludge, solvents, and other hazardous byproducts were buried in the river's sandy bottom. Now they are beginning to uncover these. Following the privatization, the Swedes are planning to clean up the area in accordance with Western standards. They bought LRF with the stipulation that the AVU would foot the bill for repairing the environmental damages. Almost 50 million forints have

already been spent so far for research and planning. Fifty-five hundred tons of galvanic sludge has been transported to Aszod.

Martech worked out a plan for cleaning up the soil at the illegal dump sites of Neszur and Oregerdo. The barrels of hazardous waste dug up from the sandy burial sites will also be transported to Aszod.

Although they have been complaining about the environmental pollution for 10 years, no one really listened to the region's residents until now. True, a volunteer control committee had been set up to cooperate with the Swedish environmental experts, but its recommendations were largely ignored. But they have recently organized a residents' forum that was attended by a Martech representative, Swedish and Hungarian experts of LRF, the environmental authorities, a public health representative, a medical officer, Jasz-Nagykun-Szolnok County officials, numerous reporters, and the involved residents.

Drinking Water for Lack of Anything Better

Jaszbereny Mayor Dr. Levente Magyar reproached LRF's Hungarian executives because, in his opinion, they have not done everything they could to completely reveal all their "sins." According to those present, there should be bills of lading and receipts to show what was shipped, when, and where. But LRF executives are showing strange symptoms of collective amnesia. For it is not certain at all that these recently uncovered seven sites are the only ones where hazardous wastes are buried. The water of Neszur's and Oregerdo's wells have been examined recently by public health officials. And they found everything in them except water. They contain copper, zinc, lead, cadmium, nickel, chrome, mercury, arsenic, and nitrates. The official evaluation was: "Acceptable as drinking water for lack of anything better."

Different Measurements

According to the residents, the examination of the wells indicates that hazardous waste was dumped at other locations as well. But where? LRF officials do not know

of any other location. But Neszur residents identified three additional locations. They do not believe public health chief Dr. Gyorgy Kadar, who was trying to prove that zinc was the only pollutant that exceeded permissible levels, and that the cause for that could have been the fact that people use zinc-coated buckets to take water from the wells and, moreover, that the structure of the soil could also have been the culprit. Residents of the region are now looking for an independent laboratory to carry out further measurements. They have also asked the Swedes to have all wells—almost 200—checked.

It is unlikely that this will happen; however, the Swedish environmental experts promised in no uncertain terms that they will examine the newly identified locations as well. On the other hand, LRF experts who were present at the forum emphasized that they are observing the laws—which were made after the hazardous waste had been deposited. And they have been "cleaning up" diligently both within and without the plant since 1990. They have done everything they could in the interest of protecting the environment.

Action of Collecting Signatures

Those present found all this inadequate. It was said that those responsible for the damages must be sought out, for what happened at Jaszbereny's outskirts was criminal. Even the issue of compensation was brought up. Their real estate properties are now of lesser value and no one buys their produce at the market, for the plants soak up the water-soluble pollutants. Not to mention that the previous regime held back information from them. They were thus completely unaware that by pouring out the contents of one or two dug-up barrels, they themselves also caused damage. They used the barrels for collecting mash and for distilling brandy, endangering their own health.

The Swedes would like at least to begin cleaning the soil. But, for the time being, no one knows when they plan to do this. Owners of small gardens in Neszur have begun collecting signatures. They would like to have the dump site designated by the Swedish and American experts—where the less-polluted soil would be taken—moved elsewhere.

BRAZIL

Entrepreneurs, Environment Coexist in Amazon

92SM0391A Sao Paulo VEJA in Portuguese 22 Apr 92
pp 64-71

[Article by Marcos Piveta, Marcelo Auler, and Gustavo Paul: "Our People in the Forest"]

[Text] Paragominas and Porto Velho—While ecologists debate the dangers besetting the Amazon Region, the region's inhabitants are creating rational ways of coexisting with the jungle.

The Amazon Region has aroused the concern of nine of every 10 of the activists, ecologists, and statesmen who will attend Eco-92 [UN Conference on Environment and Development], but the ecological picture in the Amazon Region is not as dark as it looks. While international ecologists debate whether burning and deforestation may be endangering the planet's most valuable reserve of tropical forests, the region's millions of inhabitants are trying to establish rational ways of coexisting with the jungle. Solutions that provide for preserving the forest while also ensuring continuation of the culture that has grown up in the water-soaked universe of the forest have recently appeared.

Fishing is one major solution for the Amazon Region's economy. There is talk here of fishing on an industrial scale like that achieved by a champion in the field, the Figueiras Packinghouse in Manacapuru, an Amazon municipality on the banks of the Solimoes River two hours from Manaus. Established 12 years ago, the packinghouse used to limit itself to selling frozen fish. It would lay off 80 percent of its workers in December and remain idle for six months out of the year. Four years ago the firm was on the verge of bankruptcy, and it was bought by the Sheik group of Sao Paulo. Then came the miracle of the fish. The company began processing its fish industrially and selling the product to middlemen. Now it operates year-round. The new owners are now preparing to start billing in dollars this year. "There is an abundance of raw material in the region. Investment and creativity are all it takes to turn that raw material into dollars," says Celso Corradi, production manager at the Figueiras Packinghouse.

Today the packinghouse works with fish that are scorned by the people living along the river and sells new products such as fish patties. In 1989 it billed \$500,000 and employed 100 people at the peak of production. It expects to bill \$3 million and to employ four times as many people in 1992. Half of the fish processed by Figueiras wind up on the plates of Sao Paulo residents, and the rest are scattered throughout Minas Gerais, Goias, and Pernambuco. But it is the promising international market, especially for fish patties, that most fascinates Figueiras's owners. "By the end of this year, we will have launched into the U.S. market," says Corradi. And 30 percent of the company's billing is expected to come from exports in 1993.

Power plants postponed—The example provided by fish is proof of the tropical region's tremendous generosity when properly exploited. "The only person who can doubt the Amazon Region's potential is the one who sees it as an ecological obstacle rather than as the homeland of millions of Brazilians," says Elton Rohnelt, a native of Rio Grande do Sul who took his chances in the region over 20 years ago and is now Roraima's secretary of mining. One of the biggest obstacles to settlement of Brazil's tropical region has always been the electricity supply. Since the land slopes at a rate of only 2 centimeters per kilometer, the Amazon Basin is the last place on the planet where one might consider building hydroelectric plants. Those that have been built are going to generate almost insoluble social and ecological problems. This is the case with Balbina, north of Manaus, and with Tucuruí, in Para. Other solutions are in sight.

"We have a lot of gas," says Rafael Schettini Frazao, superintendent of Petrobras' [Brazilian Petroleum Corporation's] Amazonas Production District. "There is enough of that fuel to justify abandoning construction plans for at least three hydroelectric plants," says Frazao. Before deciding to use gas in thermoelectric plants, Eletronorte [Northern Electric Power Plants] had plans to build two new hydroelectric plants: Cachoeira Porteira in Amazonas and Ji-Parana in Rondonia. Construction of those plants has now been postponed until the year 2015, and the construction of thermoelectric plants is scheduled to begin on the basis of studies being conducted jointly by Petrobras and Eletronorte [Brazilian Electric Power Company, Inc.]. If a decision is reached this year, the first thermoelectric plants can begin operating in 1996.

Satellites and fines: The loss of plant cover in the Amazon Region is estimated at eight percent—a vast area the size of Japan—but the destruction has been brought to a halt. A program combining satellite surveillance from the sky and heavy fines on the ground is successfully holding back the frontiers of deforestation. Seasons of heavy rain and the Brazilian recession have also helped slow the rate of destruction. The rate of deforestation has been diminishing for the past three years. The most recent data show that 0.28 percent of the forest was lost in 1991. That is one-tenth of the number of trees that were being cut down five years ago, and it is less than the average plant loss throughout the world (0.3 percent). "The situation has improved considerably, but the data must be seen as a reason to struggle even harder to halt deforestation," says Philip Fearnside, an expert at the National Institute for Amazon Region Research [INPA] in Manaus.

The Amazon Region's residents—one out of every five Brazilians—were drawn there by the possibility of getting rich in a land of adventure and risk. For more than a decade, they used the manna of the forests as they wished, extracting gold from the surface and the riverbeds by the use of dredges that filled the shallow jungle waterways with mud and made them barren. Land was cleared as though survival depended on winning a war

against nature. In the mid-1980's, ecological awareness jumped from the T-shirts of hippies to the desks of chiefs of state and presidents of large firms, and the Amazon model began to be exhausted. "The Amazon man had no way of keeping up the the world's technological development and was being left behind," says Gilberto Mestrinho, governor of Amazonas. "We are still living in the handicraft stage, and most of our people still fish the way our forefathers did." The situation is beginning to change.

Floating tourism: When well treated, Amazon nature liberally rewards and compensates those who preserve it. Tourism is the best example of this. In 1983, Francisco Ritta Bernardino, the owner of a three-star hotel in Manaus, heard this prophecy from a famous guest: "Ten years from now, the world will be concerned and occupied with the Amazon Region." That guest's name was Jacques Cousteau. Bernardino was paying attention, and three years later, when the drums in defense of the jungle began to be heard from the First World, he decided to bet his money on ecological tourism by preparing a place in the jungle to welcome the apostles of its salvation. In Governor Gilberto Mestrinho's opinion, ecological tourism may become one of the principal underpinnings of the local economy. "The idea is to attract to the Amazon Region a chunk of the market that spends more than \$1 trillion every year worldwide," says Mestrinho. "The Amazon Region has a new world of attractions to offer, and interest in the forest is growing steadily throughout the world," the governor says.

Erected in the middle of the jungle, an hour's launch ride from Manaus, the hotel started with four rooms. By June, when it is expected to become a compulsory stop for the lucky ecologists playing tourist at the Rio de Janeiro conference, the hotel with the pompous name—Ariau Jungle Tower—will have 92 apartments. Bernardino has spent \$100,000 on advertising abroad, and last year he billed \$250,000 by taking in such prominent figures as German Chancellor Helmut Kohl, actors Tom Cruise and Olivia Newton-John, and the president of the Workers Party, Luis Inacio Lula da Silva. Luxury hotels in the jungle are becoming a specialty of the Amazon Region. There are five just in the floating luxury class, all in the superstar category. Bernardino knows all the tricks for making those hotels on rafts operate smoothly. To light his hotel, heat its shower water, and operate its telephone system, he has four generators that consume 60 liters of diesel oil every day. From his office, he sends faxes to Japan by direct satellite pickup. "It is possible to make money and live well from tourism in the Amazon Region," says Bernardino.

Steer's hoof: On the eve of Eco-92, the Amazon Region can show the world that it has even learned how to turn its biggest sources of aggression and misfortune—stock raising and the lumber industry—around. Isolated experiments in forest management and stock raising in already devastated areas are proving successful. If the efficiency of economic investments in the Amazon Region can be measured by the amount of resources

produced for every square kilometer of forest devastated, stock raising is, at first glance, a failure. To generate \$1 million in the Amazon Region, a stock raiser needs to clear 100 square kilometers, or 10 times as much as is needed to grow guarana, a plant native to the region, and nearly 100 times as much as is necessary for mining. The fantastic mineral province located in the Amazon Region's subsoil has also not yet produced what is expected of it. The fear exists that because of the declining price of raw materials in the world, this treasure will be worth less with every year that passes. Ever since taking office, the Mestrinho administration has faced a challenge that would make any administrator pull out every last hair in his head. Amazonas is a state whose development is still limited. The governor admits that making the state viable mainly on the basis of its traditional calling—extractive activity—is not an easy task. "Today there is no primary product that is worth more than half what it was worth 15 years ago," the governor says, citing gold, rubber, and wood as examples. Jute was introduced by the Japanese before World War II, and it accounted for 40 percent of the state's exports at the end of the 1970's, but now it is practically nonexistent.

Stock raising is not even useful from the standpoint of job creation—the alibi used by all entrepreneurs. According to calculations by the Ministry of Agriculture, which began encouraging stock raising in the region years ago, a maximum of five jobs are created for every 1,000 hectares devoted to stock raising.

A steer's hoof was not made to tread the region's poor soil, which it turns into ground so sandy that not even grasses will grow on it. The damage done by cattle led Volkswagen, which introduced one of the Amazon Region's largest stock raising projects—the Rio Cristalino Valley Ranch—to abandon the project. There were 37,000 head of cattle on 139,000 hectares in Santana do Araguaia, Para. In 1986, the firm sold everything to the Matsubara group of Parana for \$30 million. Today 160 employees take care of the ranch, 240 fewer than were employed by Volkswagen. It costs 60 million cruzeiros a month to keep the Rio Cristalino Valley Ranch running, and Hideto Matsubara, the ranch manager, says it turns a profit.

Small ranches: While it is not worthwhile to clear the Amazon forest to establish stock raising projects, raising livestock on land already devastated may be an intelligent approach. Agronomist Marli Mattos, a researcher for Imazon, supports the idea. She says: "The areas already cleared should be put to good use. I just don't agree with the idea of cutting down virgin forest to make room for grazing land." "The important thing is to avoid the big projects of the past and to try to raise livestock on small ranches of no more than 2,000 hectares," says agricultural engineer Cristo Nazare Barbosa do Nascimento, former director of Embrapa (Brazilian Agriculture and Livestock Research Enterprise) in Belem. He recommends raising buffalo instead of cattle in the Amazon Region's floodplains. He says that buffalo are

better suited to the existing conditions. The weight of his herd increases by 10 percent per year, while his cattle herd grows by only two percent.

Stock raising has been losing ground to lumber operations since the 1970's. Many ranchers have realized that the two activities can be complementary. It is easier to form grassland in a forest area stripped of its trees than in a forest area that is still intact. A good many of the sawmill owners keep herds, and many ranchers are exploiting timber or selling the extraction rights. Brazil's biggest lumbering center is in Paragominas, 340 kilometers from Belem. Every month, 112,000 cubic meters of wood leave that region, representing billings of \$11 million for the region's 250 sawmills.

Wasted timber: It is the nightmare of ecologists, and it alarms anyone who sees the devastation. The lumber mill owners promise Ibama [Brazilian Institute for Environmental Affairs and Renewable Natural Resources] that they will replant cleared areas with native trees. It is a complete lie. All they do is yank out the timber. Less than one percent of the deforested areas has been genuinely replanted. All of this is happening under Ibama's nose, and it is one of the crimes being committed against the Amazon environment. There is a further difficulty. A large portion of the wood that is cut down is not even used for any worthwhile purpose. It rots on the ground in some cases. The center exports 15 percent of its production, and to keep its foreign market safe from the fury of ecologists, it prints forest management stamps on its wooden crates. American Richard Bruce, a former professor at the University of Washington, where he taught forest economics for 18 years, is one of those supporting forest management.

Management in the Amazon Region means basically cutting trees in the floodplain, because the low density of those trees enables them to float in the rivers, and felling the older trees. "It does no good to preserve an already mature tree that is old, rotting, and preventing the others from growing. Management serves to oxygenate the forest," says Bruce. That approach is also favored by Governor Gilberto Mestrinho. Timber from the floodplains supplies the furniture industry with laminated wood and plywood. The trees on terra firma are predominantly of denser wood that is used to build boats and houses. Those woods do not float, are difficult to cut, and are less profitable. In Amazonas State, floodplain wood accounts for 17 percent of the total plant cover.

Management represents progress in the exploitation of wood in the Amazon Region, but it does not solve all the problems involved. Studies by agricultural engineer Christopher Uhl, a former professor at Pennsylvania State University who established the Imazon research institute, prove that 50 percent of an area from which lumber is extracted winds up devastated. When a tree trunk is felled by a chain saw, it knocks down the smaller trees around it. To gain access to the dense forest, lumbermen have to build small roads in the jungle with the help of tractors. The trunks are pulled by steel cables attached to

tractors, and only then are they placed on the trucks that take them to the sawmills. Rational forest management will also never be achieved at the lumber industry's current level of productivity in Brazil. Here, 50 percent of the timber taken from the forests is wasted, while a Swedish lumber producer wastes only two percent.

Expelled from paradise: The preferred option for ecological protection is creating problems in the Amazon Region because the local communities are being excluded from the benefits of preservation. On the banks of the Negro River in the northern part of Amazonas State, the small town of Novo Airao has swelled in population over the past 10 years as a result of a typical phenomenon of unproductive environmentalism. Its population jumped from 4,000 in 1981 to 14,000 in 1991 as people moved in after being expelled from the Jau National Park, a 2.3-million-hectare area 100 kilometers from Novo Airao that is now being watched over efficiently by Ibama, the federal institute for environmental conservation.

What had been the promised land for Brazilian migrants became an ecological reserve, and they were transformed into ecological returnees. Maria Benedita Nascimento, 75, whose parents were from Sergipe, was born in the reserve area and bore her eight children there. She and her family lived by fishing, hunting, and growing manioc and bananas. She left the reserve in 1989. "They said I could no longer clear land for planting," says Maria's son Nabor Bernardino, 39, who now goes around Novo Airao selling bread. His wife has been hired by the municipal government to keep the streets clear of weeds.

When the park was established in the late 1970's, inspectors from Ibama's predecessor, the IBDF [Brazilian Forestry Development Institute], also prohibited entry by the boats that carried out the small amount of rubber produced by the community and brought in medicines and foodstuffs that the residents bought in exchange for fish, flour, and corn. "When I lived on the reserve, my life depended only on me and my work. Now everything depends on money," complains rubber gatherer Pedro Monteiro, who began using money only two years ago in Novo Airao. The tragedy of the ecological migrants cannot be seen as an argument against the adoption of harsh preservation measures. It merely points to the need for a better way of implementing decrees for the conservation of areas considered valuable. The evacuation of the Jau National Park should have been preceded by a program for the guidance and advancement of the area's residents.

No calcium: During 20 years of intensive settlement of the Amazon Region, more than \$10 billion has been spent on tax incentives and the financing of major projects in the region. Such expenditure is justified only by the wealth remaining to be exploited in the region. No one knows what price tag to place on the Amazon Region, but regardless of its value, most of that value is still hidden beneath the leafy crowns of the trees. On the banks of the rivers in this El Dorado of ecosystems live

thousands of people who conceal, behind a strong and healthy appearance, a poor diet that is limited basically to fish and manioc flour. "Malnutrition is one of the most serious problems for the Amazon population," says American Tony Barret of the INPA's Pathology Department in Manaus.

"The people living along the rivers are not in the habit of planting vegetables or raising chickens," explains Amazonas Governor Gilberto Mestrinho. Since they also do not keep cows, they rarely drink milk, and they suffer from calcium deficiency. A good many of the inhabitants lose their teeth at a young age. Francisco Alves da Cruz, 56, and Maria das Dores Oliveira, 50, are a typical married couple living along the river. They have seven children and live on the banks of the Negro River 12 hours by boat from Manaus. On two hectares of land, they have a manioc field from which they harvest two crops per year. That is the only time they buy coffee, milk, rice, and beans. Francisco fishes with a rod and does not hunt because, he says, there are no animals around there. He also does not grow fruits or vegetables. "To grow things, you have to keep at it and work at it every day," Maria das Dores explains. Mestrinho says: "We have to awaken ambition and a sense of production in the backwoodsman."

Groceries: The adventuresome migrants from the South who invaded the Amazon Region in hordes during the mid-1970's came loaded with a different mentality in which ambition was predominant. Twenty-three years ago, cousins Serafina and Electro Azevedo Soares left the town of Gurupi in Goias and settled in Porto Velho. They were both 32 years old. Electro had gotten to know Rondonia during a trip by truck. "He came back determined to move there," says Serafina. They sold everything they had: the ranch and a grain trading store. They settled down with their three children. The husband began buying and selling cassiterite. One year later, the couple opened a grocery store, where they installed a pool table. They abandoned the ore business and soon had pool tables scattered throughout the Amazon Region as far as Venezuela. The business paid off, and they went into the excavating business.

After two years in Rondonia, they were able to build their first house in Porto Velho. They bought a ranch. A year later, 12,000 head of cattle were grazing there. Two years ago they achieved their dream of building a \$1 million mansion in the middle of the Amazon Forest. "I always wanted a big house where I could entertain relatives from Goias," says Serafina. The house has 10 bedrooms, closed-circuit television, electronic gates, 22 telephone extensions, a sauna, and a swimming pool. They keep four cars in the garage: a Del Rey, a Pampa, an Opala, and an F-1000. Their son Francisco owns a motorboat for cruises on the Candeas River, which runs through the back part of the property. They are not familiar with Rio de Janeiro or Sao Paulo. They always go to Goias to visit relatives. They have built 30 reservoirs on the ranch and now raise fish. "The Amazon Region rewards anyone who works with a passion," says

Serafina. When they meet around the debating tables at Eco-92, it will do the debaters good to realize that living alongside the forest people are millions of Brazilians who have adopted the Amazon Region as their new homeland: a place in which to live, progress, and grow rich.

Specter of Invasion

The Brazilian military is hammering away at the idea that the developed countries want to take possession of the Amazon Region, and they are discussing that specter in secret documents. In July 1990, the Armed Forces General Staff [EMFA] produced a report accusing religious organizations of fronting for foreign powers in the forest. The military quote a passage from an alleged secret document published by the Christian Church World Council [in English, as published] that says that the Amazon Region will be invaded in the future. "That document is a fraud," said Archbishop Luciano Mendes de Almeida. Based on that report, the EMFA has prepared itself to defend the forest: "We must occupy what is ours in the shortest time possible." What we have in both reports is the caricature of an ecological problem.

Good and Bad Examples

The Amazon Region is riddled with scars left behind by megalomaniacal projects that tore up the forest, surrendered to the inclemency of tropical nature, yielded few dividends, and wound up being abandoned. The story of Carajas, the iron mine opened by the Rio Doce Valley Company [CVRD] in Para, was different. The CVRD extracts 35 million metric tons of iron ore every year from the planet's largest mineral province while causing minimum damage to the environment. Only 1.6 percent of the 410,000 hectares in Carajas has been deforested since 1980, when the project began. "The rest is untouched forest," says Luis Carlos Nepomuceno, the CVRD's environmental manager in Carajas.

Carajas is the exception. The rule is that of ruinous projects like the pig iron mills that get their raw material from the Carajas deposits but formerly cleared virgin forest to fuel their furnaces with charcoal. They were recently prohibited from cutting down native trees. Most of them collapsed. Others are still operating illegally. Of the 32 pig iron mills scheduled to operate in the Carajas region, only four survived: two in Para and two in Maranhao. One of them, the Para Iron and Steel Company [Cosipar] in Maraba, has worked out a plan for producing pig iron without harming the forest. Its source of charcoal is the waste from sawmills and trees that fall naturally on the ranches in the region. Ecologists condemn the iron and steel industry in the Amazon Region, even when it operates according to the Cosipar plan. The argument is that the sources used by the iron and steel industry are not infinite and that once exhausted, they will place the forest in danger of being turned into charcoal.

Palefaces Surrounded

Boa Vista: "We are the only state in Brazil that has a white reservation," complains Ottomar Pinto, governor of Roraima State. Ottomar took office in 1991 with the mission of transforming the former federal territory into a genuine state. His mission has become impossible. In recent times, he has lost control of most of Roraima's territory, either because it has been demarcated as Indian reservations or because it is protected by the Federal Government for ecological stations. Ibama has banned economic exploitation of the 84 percent of Roraima's territory where there is still untouched forest. The final blow was the Federal Government's decision to demarcate the 94,000 square kilometers constituting Ianomani lands—an area the size of Portugal and located in the northwestern part of the state. All in all, less than 10 percent of Roraima's territory has been left for settlement by palefaces. Three-fourths of Roraima's inhabitants live and work in the vicinity of the capital, Boa Vista, the only area where economic exploitation is permitted. It is the white man's reservation referred to by Ottomar Pinto.

The state government and ranchers do not question the legitimacy of the Indian lands. "We are in favor of demarcation," says rancher Jose Augusto Soares, president of the Roraima Defense Council, which is an organization along the lines of the UDR [Rural Democratic Union]. "But they don't need that much land," argues Governor Ottomar. The population density on the Ianomani Reservation is 0.13 inhabitant per square kilometer. On the white reservation, the density is seven persons per square kilometer. "With the exception of the Ianomani, all the Indians in Roraima are now civilized. Those tribes have been in permanent contact with the whites for at least a century. They should be treated like any other rural landowner," says Ottomar. The Indian settlements now have schools, telephones, and even television. The Indians vote, and most of them are Catholics.

Roraima is a fictional state. Tax collections cover only 10 percent of its expenditures. For the rest of its spending, it depends on revenue sharing by the Federal Government. Its GDP of \$268 million is the lowest of all the Brazilian states and 10 times less than that of Haiti, America's most poverty-stricken country. Roraima is five times larger than the State of Rio de Janeiro, but its population would fit inside Maracana and Maracana-zinho Stadiums together. It has 206,000 inhabitants. Agriculture and stock raising are the basis of the state's economy. The state has no industry and buys almost everything it consumes from outside. The cement used in Roraima comes from Venezuela. The government has imported 20,000 sacks that cost 60 percent less in Manaus. The state's list of exports consists solely of rice, which is consumed in Amazonas.

The former territory was never suited for agriculture. Its soils are clayey and unproductive. The prospects for

development were once located farther down, in a subsoil rich in cassiterite. The best deposits are on the Ianomani and Macuxi Reservations in the Raposa and Sao Marcos Mountains. Those regions are being demarcated by President Fernando Collor. Economic exploitation in those areas will depend on the will of the Indians and on authorization from the National Congress. "We have nearly \$1 trillion in the subsoil on the Ianomani Reservation," estimates Planning Secretary Haroldo Santos, who is waiting for Congress to regulate mining on Indian lands.

Space: Gold and cassiterite mining, which attracted 40,000 prospectors to the state in the past decade, is still going on, although not on a regular basis. The Ianomani Reservation is forcing the prospectors to go to other states or to Venezuela, but part of the population still lives by buying and selling gold and diamonds, and it is causing the outskirts of Boa Vista to grow. "What we need is space in which to settle those people," says Ottomar Pinto, governor of the white reservation.

The new reality of Roraima is scaring away investment and frightening the thousands of migrants who have settled there in recent decades. It is not just the prospectors who are taking the road to Venezuela. A good many members of the liberal professions, merchants, and ranchers are beginning to see Venezuela as a more attractive place to do business. To reach Venezuela, all one has to do is follow the 210 kilometers of dirt road separating Boa Vista from the border. From there to the Caribbean, there is an 800 kilometer asphalt highway. Connections with the rest of Brazil are discouraging: a 770 kilometer dirt road to Manaus, one commercial flight per day, and a river, the Branco, which is dry for half the year and cannot be used for carrying freight. "The businessmen who still invest here are incurable optimists," says the governor.

'Explosive shoot-'em-up':

The constraints facing the white man are growing in number. Parana dentist Alvaro Calegari landed in Roraima 10 years ago and bought a ranch 50 kilometers from Boa Vista. Documents from 1914 guaranteed the origin of the land and proved that it did not belong to Indians. A year later, studies by Funai [National Indian Foundation] established that half the ranch was on land that was part of Aldeia Canauanin, a Wapixana Indian village. Since then, Calegari has wasted more time on writs of security than on investments to improve the ranch. "I am not going to invest without the secure knowledge that the land will continue to be mine," complains the rancher, who is now thinking of opening a dental practice in Venezuela. "I will never leave Roraima. The ranch I bought has existed since 1910, and there was no Indian anywhere around it," says rancher Wilson Bezerra, the owner of three ranches in the vicinity of the Sol and Sao Marcos Mountains, where he runs 1,200 head of cattle. "There is no way that I'm going to leave," says Bezerra defiantly. His name is

found on the lists circulated by Indian defense organizations to report the state's most violent ranchers. He is accused of invading and setting fire to Indian settlements.

The Indians accuse the whites of squatting on their land and preventing fishing and hunting. "The white man has grabbed the best land and does not let us get food," says Macuxi Indian Orlando Viriato Raposo, a teacher at the state school in the Raposa Indian Village, one of the biggest in the state. "They have been in the region for centuries, and we must protect their culture and tradition, as the Constitution directs," says the president of Funai, Sidney Possuelo. "This business here is turning into an explosive shoot-'em-up," warns dentist Alvaro Calegari. In 10 years, Indian leaders have recorded at least 30 episodes of violence between ranchers and Indians.

Japanese Government To Invest in Decontamination Projects

PYG905030092 Brasilia Voz do Brasil Network in Portuguese 2200 GMT 7 May 92

[Report by Lourival Macedo at Planalto Palace]

[Text] The Japanese Government will invest \$453 million in projects to decontaminate the Tiete River in Sao Paulo State and Guanabara Bay in Rio de Janeiro State. This information was supplied by Planalto Palace spokesperson Pedro Luiz Rodrigues.

Rodrigues said that during a meeting at 0900 today President Collor announced to his chief advisers the visit to Brazil of a mission of the Japanese Government's foreign projects financing agency. The representatives of this agency will arrive in Brazil on 10 May and remain in our country until 25 May. They will carry out a final evaluation of five [number as heard] environmental projects the Japanese Government will finance in Brazil for a total of \$585 million. Of this total, \$200 million will be used to decontaminate Guanabara Bay and \$253 million will be used to expand the Tiete River's channel and integrated system [sistema integrado].

The Japanese Government also will finance the construction of a thermoelectric power plant in Sao Paulo, using urban trash as a fuel. Financing of this project will total \$72 million.

Another program that will be financed by the Japanese agency involves controlling floods in Cambuci in Sao Paulo State. Financing of this program will total \$60 million.

HONDURAS

Rate of Deforestation Increasing

92WN0494A Tegucigalpa LA TRIBUNA in Spanish 13 Apr 92 p 7

[Article by Mario Urrutia]

[Text] Almost 2 million hectares of woodland, an area comparable in size to El Salvador, have been deforested in the last 15 years, according to the reports of the Honduran Corporation for Forest Development.

The causes of this alarming destruction of the forests are migratory farming, consumption of firewood, extensive livestock raising, the use of timber for export and local construction, forest fires, and inadequate extraction of resins.

In 1991, 2,618 fires, which razed 64,568 hectares, were reported.

Honduras has 5 million hectares covered with vegetation, of which latifoliate woodland species account for 53 percent, while pine accounts for 47 percent.

The rate of deforestation is 100,000 hectares annually, representing a loss of 25,000 hectares of pine and 75,000 hectares of latifoliate woodland vegetation every year.

The consequences of the destruction of the forest are climatic changes, summer droughts or winter floods, soil erosion and loss of nutrients, and habitat destruction that results in the migration of animals to other zones, creating overpopulation and ecological imbalance.

With the loss of the forests, animal and plant life are destroyed. This phenomenon is further aggravated by uncontrolled hunting, with the result that 41 percent of the existing species are in danger of extinction.

Biologist Lisa Villela has indicated that only seven percent of the land surface is covered by tropical forest, but this area is the habitat of 50 to 80 percent of the species on the planet. It is characterized by diversity, unique in the world and of vital importance to the survival of the ecosystem.

It is estimated that fires and the felling of timber are destroying a wooded area equal to one soccer field every second and that this is rendering a hundred species extinct every day.

Only 1.7 million of the estimated 30 million forms of life have been classified, so by the year 2000, the world will be losing valuable information.

The belief is that some 15 percent of the flora in Honduras is "still alive, but doomed;" it will not survive because of cutting and fires.

So many species and ecosystems in our country are threatened because woodcutters are allowed to fell trees without planting a seedling for every tree they cut. The producers are simplifying the ecosystems by converting areas into pasture for raising cattle and into fields for planting crops for export.

The mangrove thickets have also suffered from poor forest management. They covered an estimated 91,800 hectares in the Gulf of Fonseca region in 1964, but by

1987, according to the forest census of that year, this area had been reduced to 46,758 hectares.

In the past four years, deforestation has accelerated due to the excessive selling of mangrove for fuel, the cutting of firewood for salt production, the indiscriminate use of insecticides, and the unplanned development of shrimp farming.

All of these factors are threatening the survival of the most productive marine zone in the southern part of the country.

The conversion of all of the Honduran territory into an environmental zone is of the greatest urgency. This would ensure that the peasant, the worker, the child, the housewife, the university professor, and the politician would realize that their country, their cities, and their neighborhoods cannot withstand such abuse.

The pollution of the waters and the erosion of the soil are having an impact on water resources because they are affecting the bodies of water (rivers, lakes, lagoons) and increasing sedimentation.

The use of nonbiodegradable fertilizers and insecticides such as DDT, Aldrin, Chlordane, and Kotonone, which is used in the shrimp industry in the southern zone, is harmful. Kotonone is used to separate the larva of the *Penaeus vannamei* from other accompanying species that die when the chemical is applied to them.

Domestic wastewater from the poor neighborhoods that lack basic services, as well as industrial and clinical residues, constitute another source of pollution.

Air pollution is another problem in Honduras. It is caused by the lack of regulation in the automotive industry and the burning of materials, and it affects human health.

There are, on average, 811 industrial establishments in Honduras; 46 percent of them in the Department of Cortes and 39.3 percent in Francisco Morazan.

In the two departments, there are 443 enterprises that generate toxic residues. In Tegucigalpa alone, there are four sawmills and four factories producing coffee, soap, chlorine, and batteries that lack any controls to regulate their functioning. They are the cause of the atmospheric pollution.

Specialist Mirna Marin of the Biology Department at the UNAH [National Autonomous University of Honduras] has stated that marine pollution in Honduras is caused by the discharge of industrial and domestic wastes, sewage and garbage in particular, into the rivers that run through the most heavily populated centers in the country.

They include the Choluteca, Nacaome, Goascoran, Chamelecon, and Ulua Rivers.

But the most dangerous pollution is caused by the use of products that are not biodegradable and remain in the waters forever. Over time, they break down into metabolites, or entities containing chlorine, that accumulate in the fatty tissues of the human body and are a leading cause of cancer.

The high-risk zones in terms of the transportation of pesticides and oil are the Ports of Cortes, Castilla, La Ceiba, Tela, and San Lorenzo.

The contamination of the water, soil, air, and coastal zones; the loss of woodlands and water sources; and erosion are sins that cost us very dearly when the environment makes us pay for our errors. Faced with this problem, it is the obligation of all of us to protect the environment.

REGIONAL AFFAIRS

India's Kamal Nath Addresses SAARC Environment Ministers

92WN0496A Bombay THE TIMES OF INDIA
in English 9 Apr 92 p 7

[Text] New Delhi, April 8 (PTI). India today expressed serious concern over possible "undesirable ideas" like conditionalities in financial assistance that might be pushed through at the forthcoming United Nations Conference on Environment and Development (UNCED) and called upon the SAARC [South Asian Association for Regional Cooperation] nations to jointly resist pressures on the developing countries from "vested interests."

Addressing the inaugural session of the two-day conference of SAARC environment ministers here today, the minister for environment and forests, Mr. Kamal Nath, listed five specific areas and said the conference would be "counterproductive" if any of these elements were allowed to "creep into international arrangements" as a result of the UNCED, being held in Rio de Janeiro in June.

The SAARC conference, being attended by environment ministers of Bangladesh, Bhutan, Maldives, Nepal, Sri Lanka and Pakistan besides India, aims to harmonise the views of the SAARC nations to be adopted at the UNCED.

In his introductory remarks, the SAARC secretary-general, Mr. Ibrahim Husain Zaki, observed that the developed countries, responsible for environmental damage, were exercising "great pressures" for imposing rigorous environmental standards and heavy obligations for all countries without committing financial assistance to the developing countries.

The decision for the SAARC environment ministers' conference was taken at the last SAARC summit held at Colombo in November last year.

Mr. Dasho Leki Dorji (Bhutan), Mr. Abdulla Al Noman (Bangladesh), Mr. Ismail Shafeeu (Maldives), Mr. Biramani Dhakal (Nepal), Mr. Anwar Saifulla (Pakistan) and Mr. Vincent Perera (Sri Lanka) are representing their respective countries at the conference.

Listing his apprehensions the developed countries might try to force on the developing countries at the UNCED, Mr. Kamal Nath observed that conditionalities in financial assistance or trade on the grounds of environmental protection could be the major one.

He said the other areas are globalisation of natural resources which are within national jurisdiction, or move towards global agreements about the management and use of resources such as forests, diversion of present

development assistance towards proposed environmental programmes and attempt to fix environmental standards at the international level in place of standards at the national level.

Recalling the seven-point Indian stand made abundantly clear by him at the recent special session of the UN Environment Programme in Nairobi, the Indian minister said the position of the country on these basic issues has not changed.

National sovereignty over natural resources and the right to determine plans and policies at the national level, responsibility of the developed countries to take major action to address environmental problems and to provide financial and technical support to the developing countries for these purposes were the highlight of the Indian position.

India had also stressed that multilateral financial institutions for funding environmental programmes should be made more transparent and should be administered democratically.

Mr. Kamal Nath said agreements of concrete action with strong commitment towards financial resources are central to the success of the UNCED.

"Just another declaration emerging from Rio would be disappointing to us all. So also, only the signing of one or two conventions such as on bio-diversity and climatic change."

Saying that the developing countries were not using the environment issue "as merely an excuse to seek greater funding or concessions of that nature," Mr. Kamal Nath said the funds required to meet the challenges of environment and development "would have to be qualitatively different from international aid which has characterised the last few decades."

"It is no longer a matter of aid, much less of charity," he said adding that financial cooperation between the developed and the developing countries "must now be in the context of an equitable partnership towards protection of our planet and towards equitable development of mankind."

The ongoing negotiations for conventions on climatic change and bio-diversity are really separate processes but have become linked to the UNCED due to the timing of the negotiation coinciding with the UNCED and that there are some common critical issues such as commitments towards large-scale action, financial resources and transfer of technology.

He said both issues are of enormous importance as far as the SAARC region was concerned.

Mr. Kamal Nath noted that a change in the climate threatens agricultural stability and monsoon patterns in the region. Similarly it threatens the forest wealth and a

rise in sea levels would directly affect about 250 million people living along the coasts and on the islands in the SAARC region.

The minister urged his counterparts from the SAARC countries to resolve to make common concerns for the environment and common yearning for developing "a model for South Asian cooperation."

BANGLADESH

Cabinet Approves National Environment Policy

92WN0528A Dhaka *THE BANGLADESH OBSERVER* in English 14 Apr 92 p 1

[Text] The Cabinet has approved the national environment policy and the action plan for implementation of the policy, reports BSS.

The approval was given at the regular weekly meeting of the Cabinet held at Bangabhaban on Monday with Prime Minister Begum Khaleda Zia in the Chair.

The policy has been adopted to help conserve and develop the ecological balance, the country from natural calamities, identify the nature of all sorts of pollution and control thereof, ensure durable development in every sphere suiting the demand of the environment, ensure judicious and long term use of all national resources and keep nation alive to all international steps in connection with the environment as far as possible.

The Cabinet also approved in principle the draft of the law framed for the purpose of establishment of open university in the country.

Ministers, state ministers-in-charge of different ministries and divisions attended the meeting.

Cabinet Secretary, Principal Secretary to the Prime Minister and concerned secretaries were present.

INDIA

Environment Audit Made Compulsory for Industries

92WN0444A Madras *THE HINDU* in English 28 Mar 92 p 6

[Article: "Environment Audit Made Compulsory for Industries"]

[Text] New Delhi, March 27—For all industries which require authorisation under the Air, Water and Environment Protection Acts [AWEPAs], environment audit has been made compulsory in each financial year beginning April 1, this year. A notification of this effect has recently been issued by the Ministry of Environment and Forests.

This is the beginning of the process envisaged by the Ministry for a detailed environment audit to be compulsorily published as part of the company's annual report. But for that some amendment needs to be made in the Companies' Act. Since that will take sometime, for the moment the Ministry of Environment has notified compulsory environment audit under the Environment Protection Acts.

An environment audit will now have to be submitted to the State pollution control board concerned by every industry on or before May 15 of every year, covering the financial year beginning next month. This audit will be a statement on the nature of wastes, liquid, gaseous or solid, that are generated from the industrial processes. Details of the methods adopted for pollution control, recycling of wastes and final disposal will have to be given in writing.

Industries will also be expected to make their own assessment of the damage caused to the environment by the pollution and what impact pollution control measures could make.

Indian Ocean Marine Pollution Addressed

92WN0497A Calcutta *THE STATESMAN* in English 4 Apr 92 p 12

[Text] New Delhi, April 3—The ecosystem in the Indian Ocean has been severely affected by marine pollution and the worst hit are the coral reefs and the beaches in the atolls of Lakshwadweep, Andaman and Nicobar Islands.

This observation was made by Mr. S.N. Lakhkar, director general, Coast Guards, while addressing an all-India seminar titled "marine pollution—prevention and control," held here last week.

Pointing out the adverse effects of marine pollution on the ecosystem in Indian Ocean, he said coral reefs and mangroves occurred widely in almost all countries around the Indian Ocean. Most of these coral reefs in the region have been declared endangered and several are on the verge of disappearing. While some have worn out due to their exposure to pollutants such as oil, silt, mud and raw sewage, others have been turned into sources for use as raw material in cement industry.

Due to the ever increasing demand for land and fuel, many mangrove areas have also been destroyed. This has led to heavy desiltation. With no protective cover for mangroves, coastal areas are more prone to devastation during cyclones than ever.

The deposition of silt on the bed of the Indian Ocean has been increasing because of human activities such as mining, clearance of land for agriculture, lumbering, urbanization, industrialization and dredging of harbour channels and estuaries. Silt in our rivers and coastal areas is decreasing the productivity of water and depleting for fishery resource a National Institute of

Oceanography study, which points out that the shrimp, prawn and fish yield of the Kerala coast has gone down by 25 percent from 1966-67 to 1987-88, largely due to coastal pollution, sums up the situation.

According to Mr. Lakhkar marine pollution caused by oil spills in the recent past has caused most harm. It is estimated that 75 percent of all oil spills are directly or indirectly due to human error. Equipment failure or malfunctioning accounts for the remaining 25 percent of oil spills.

"An oil spill can contaminate fishing equipment and aquaculture facilities and can cause loss of market confidence in marine products. They also interfere with the normal functioning of industries that require a continuous supply of clean sea water, hamper normal port operations and affect the life of the coastal population adversely," Mr. Lakhkar pointed out.

Nine States and five Union Territories in India fall on the coastline or from archipelagoes and 25 percent of the Indian population inhabit them. Three out of four densely populated towns and industrialized cities which are near the coast, exploit the sea for waste dumping, creating unfavourable environment for sea animals the seminar concluded.

IRAN

'Green Corps' Environmental Group To Be Created

92WN0456B Tehran KEYHAN-E HAVA'I in Persian
18 Mar 92 p 8

[News Report: "With the Participation of the Ministry of Education and Training and the Tehran Municipality, 'Green Corps' Will Be Formed To Protect the Environment"]

[Text] Tehran, 19 Esfand [9 Mar]: With the objective of expanding and preserving green spaces, the "Green Corps" has been formed with the cooperation of the ministry of education and training and the municipality of Tehran.

KEYHAN correspondent reports that Engineer Saeed Mohammadi, undersecretary for the Tehran parks and green spaces, pointed out in a press interview the importance of protecting the environment and the role of trees in human life and said, "The minimum green space required for every city dweller has been estimated to be a minimum of 15 meters; but in Tehran, there is less than 4 meters of green space for each inhabitant. If we are able to add 3,000 hectares of green space in a year, by means of a five-year plan we will be able to have at least 14 meters of green space per inhabitant."

In regard to increasing green spaces in Tehran, he said, "In the current year, Tehran's green space has increased by 2,100 hectares, which is 900 hectares more than last year. At present, tree planting in parks and roadsides

continues with the help of experts in renewing green spaces and parks in cities." He added, "In order to protect the existing green spaces, all gardens in Tehran of more than 10,000 square meters have been identified and smaller gardens also are in the process of identification and study."

In regard to the expansion of urban and wilderness parks he said, "With the help of advisers, plans for a number of parks in different parts of Tehran have been put into effect; these parks include 30-hectare Khajavi Kermani park; 2.5-hectare Gul Mohammadi park; 3-hectare Gulistan park; 6.5-hectare Wosouq ud dowlah park; 7-hectare Gulshan park; 52-hectare Pamchal park; 7-hectare Bustan park and 14-hectare 13 Aban park. In addition to these, plans for Warzesh and Shemshad parks, each measuring 30 hectares; 5-hectare Khizran park; 12-hectare Khaqani park and a comprehensive plan for a wilderness park in Surkehesar encompassing 700 hectares are all under study."

In regard to the water needed for Tehran's green spaces, Engineer Mohammadi said, "The parks organization uses the drip irrigation system that not only saves water but will also play an effective part in extending green spaces. In the current year, 400 hectares of green spaces around the Imam's holy mausoleum have been equipped with drip irrigation; a modern irrigation system will also be installed on the 220 hectares Bibi Shahr Banu area."

Referring to improving specialized knowledge among the organization's employees, he said, "We have employed 140 specialists in the Parks organization and 200 students in connection with green spaces; we have sent experts to foreign countries and utilized the services of professors and foreign experts; all our efforts have been aimed at using specialized methods in improving and expanding green spaces."

He referred to the role of the people and their participation in preserving green spaces and said, "We hope that by creating the 'Green Corps,' forming the society in support of green spaces and with the cooperation of the mass media, we will be able to benefit from the moral and material support of the people in protecting the environment and expanding green spaces."

MAURITANIA

Results of Antidesertification Project Discussed

92AF0727Z Paris JEUNE AFRIQUE ECONOMIE
in French Mar 1992 pp 176-177

[Article by Dominique Hoeltgen: "A Project Against Sand and Winds"]

[Text] Millions of ouguiya [UM] have been spent on the struggle against desertification in Mauritania. What are the results?

Truly, it is an endless job! At the top of the sand dune, one of the project managers looks at the palm trees down

in the valley and explains how to crossbreed dry field palm trees, planting them in the purple-colored sand or alongside other, leathery plants. He describes in detail the method used in the Adrar area in Mauritania, where he was born, to fight against desertification. To fight against the sand dunes that move at the terrifying speed of 6 to 10 km per year, forming, if you do not watch out, a kind of shroud for the fields of sorghum, choking the oases, the single sources of life in the desert, encircling the villages until it empties them of their people.

Project Oasis Has Two Aspects

This constant threat was the reason for beginning Project Oasis, which was undertaken five years ago by the Mauritanian Government with the help of the Arab Fund for Economic and Social Development (FADES) and the International Fund for Agricultural Development (IFAD). The objective of this operation, expected to cost 1.49 billion UM (61 percent of which is paid for by FADES, 29 percent by IFAD, and 10 percent out of the Mauritanian budget) is to save the 5,000 hectares [ha] of oases spread out in the northern and southeastern part of the country, in the Adrar, Tagant, Assaba, and Hodhs areas. These relatively small areas (compared to the total area of the country, which is 103 million hectares) in effect provide a livelihood, thanks to the date harvest, to 10,000 growers and help 230,000 people to settle down in one place. At the end of the first phase of the project the Mauritanian authorities, of course, wish to have this international aid continue, "to consolidate the achievements" of this twofold project. One aspect takes place on the dunes, a long struggle that is essential to prevent the movement of the sands. The other aspect takes place under the palm trees, where the people dig and pour cement in the hope of making more water flow and perhaps to grow more and better dates in the future.

Corera Alassane, a nature protection inspector, stood on a high point in Azougui, not far from Atar, and explained the slow and repetitive work required to stop the movement of the sands. He said: "The first job is to ensure the stability of the sand dunes by erecting by hand a dense network of woven fences, a kind of grid to trap the action of the wind.

"Then we reforest." The term may seem exaggerated to someone born in a forested area. However, in this desert situation bushes with yellow flowers and grass, which grow out of the sand are a kind of victory. Of course, this success has only been achieved after having found plant varieties adapted to the Saharan climate, which is known for its extreme variations. (Here they plant the "Prosopis Juliflora" bush of California and "Aristida Punjens" grass.) Success is also due to an innovative method of planting, with the addition of water.

Corera Alassane continued: "The essential objective is to achieve, at the time of planting, a 'balance of humidity.' If water is 40 cm [centimeters] below the surface, we apply 40 l [liters] of water immediately to the young

plant. If damp sand is found 1 m below the surface, the plant needs between 150 and 200 l of water when it is set in the ground. To make sure that water filters effectively down to the roots, we place a large, metallic cylinder in the ground around each plant until it begins to grow." This method, used here since 1986, has made it possible to save part of the Azougui palm plantations, which cover 121 ha spread along a seven km long, dry wadi. Some 13,000 palm trees support about 2,000 families who are trying to grow wheat, barley, sorghum, and fruit under the trees. However, before they consider raising double and triple crops in the oasis, the peasants of Adrar continue their struggle against the sand, day after day. This is an effort to which the peasants contribute their physical labor and from which they have been rewarded in the form of food: 3.75 kg of grain or 0.225 kg of sugar per work day. A peasant from Tougad complained: "We have not had any grain for a long time." Perhaps he forgot that the payment for his work comes at the end of the growing season in a truck from Nouakchott, under the joint control of the project inspector and the Commissariat for Food Security (CSA). Farther down the wadi the palm garden, two hours travel from the airstrip at Atar, is a lush green. It has been saved from the moving sands.

Kaba Ould Alewa, the governor of the region, estimates that half of the oases in the province of Adrar have now been saved from the destructive action of the Sahara. However, the project has not been completed. It will still be necessary to take care of irrigation problems, for example by building dikes and dams and also laying out and maintaining trails and passes through the mountains. These are questions that he would like to see taken into consideration during the next phase of Project Oasis. That is, if those providing the funds approve.

Although the struggle against desertification, which is both ridiculous and essential, can make us admire the effort, the second aspect of Project Oasis raises certain questions. This aspect involves raising crops under the palm trees and everything that can help this activity, including training, the provision of equipment or production inputs, and loans. First of all, it is surprising to note that, according to the list of achievements prepared by Abdi Ould Waghof, the coordinator, the objectives of Project Oasis are not measured in terms of additional tons of dates or millet harvested but in tons of cement and steel used. To be specific, over the past five years 4,737 tons of cement and 320 tons of steel have been used to dig 2,137 wells. (They are approaching the announced objective of 3,100 wells.) The wells are equipped with 653 motorized pumps. With the increase in well drilling, we might expect to walk through extensive, grassy fields around the wells. We might expect to see banana and grapefruit trees growing under every palm tree. Of course, at Atar, in front of the office of the Regional Inspectorate of Agriculture, there is an experimental field of alfalfa, which is cut every two weeks. A young enthusiast from the Directorate of Rural Development said: "Everything grows here, even grapevines." However, we were not able to see visual proof of this.

Elsewhere, there was nothing like that, apart from a few fields here and there, watered by a very simple irrigation system, made up of jam cans cut in half and placed between the rows of plants. Certainly, this is far from the sophisticated methods of irrigation that have existed for generations in the Touat or Mزاب areas of Algeria!

But, even so, the peasants living on the Mauritanian oases have "modern" equipment. However, although the equipment was chosen by those responsible for the project, it is not always what the peasants want. At teatime under a tent we heard them say: "The French motorized pumps are good, but the Chinese pumps are always breaking down. The meshes in the wire screens are too large. We should double the traditional rows of palm trees."

Some of the Vegetables and Fruits Rot in the Oasis

These criticisms are all the sharper, since the farmers are required to buy materials and equipment on credit, thanks to the system of loans set up under Project Oasis. The peasants say: "The interest rates on loans are too high, and the amount of money provided in the loans is inadequate." Despite these expressions of dissatisfaction everyone wants to replace their rudimentary water holes with wells equipped with motorized pumps, which costs about 300,000 ouguiya. This is a substantial amount of money for people who have no other source of income other than that obtained from the sale of their dates. And the peasants, who were burned by the experience of 1991, do not want to increase their efforts to no avail. In 1991 truck garden output tripled throughout the country, but a large proportion of the fruit and vegetables produced rotted where it was grown, in the absence of trucks to carry it to market or refrigerators to store it!

The situation is like the mirages of the desert, where true distances are underestimated and where time no longer has any importance. It will really take many years before the self-sufficient societies of Adrar, Tagant, Assaba, and Hodh become what they were tens of years ago: trading centers.

SAUDI ARABIA

Jiddah's Water Needs Covered Until Year 2000

92WN0487A Jiddah AL-JAZIRAH in Arabic 14 Apr 92
p 5

[Dispatch by Saudi Press Agency: "Vital Jiddah Water Projects To Cost 313 Million Riyals"]

[Text] Jiddah—A number of water projects are currently underway in Jiddah at a cost of 313 million Saudi riyals.

Muhammad 'Ali al-Fa'r, director general of the Jiddah Water Project, said that projects underway involve Stage 4/7, which calls for laying some 221 km of 110-mm and 160-mm pipelines and completing 4,310 residential connections in northern Jiddah.

He added that work is nearing completion on Stage 4/7, which includes laying some 291 km of 110-mm, 160-mm, and 130-mm pipelines, making 8,950 residential connections, and completing auxiliary pipeline project No.2, which involves making 3,030 assorted residential connections and laying 25 km of 110-mm and 160 mm pipelines.

He pointed out that another project being currently undertaken in Jiddah is the Jiddah Auxiliary Pipeline No. 2 which includes laying 30 kilometers of 100 mm and 160-mm pipelines and implementing stage 1/7 which calls for upgrading pumping stations 1 and 2 at the project's headquarters on al-Makarunah Street, the booster station at the university neighborhood, and the water tower.

Mr. al-Fa'r pointed out that work is also nearing completion on replacing the 1,000-mm Jiddah desalination pipeline between the desalination stations and the treatment and pumping station at the project's headquarters on al-Makarunah Street; and on Project 5/7/J to expand the booster station in the university neighborhood; and the installation of pipelines and a control room, as well as the construction of two water reservoirs, each with a capacity of 50,000 m³, east of the express line [not further specified].

The director general of the Jiddah Water Project explained that construction is also underway on four emergency collection reservoirs, each with a capacity of 50,000 m³, equipped with control rooms, electrical rooms, electronics, fire pump stations, and paved roads.

Also under construction is a new reverse osmosis station with a capacity of 15 million gallons per day at the Jiddah desalination stations.

The director general of the Jiddah Water Project added that work will soon begin on two major projects with an allocated cost of 110.84 million riyals. These are Stage 7/5/5/B, which involves installing 170 km of [water] mains and 385 km of branch lines, and making 15,855 residential connections in the neighborhood east of the express line from Wali-al-'Ahd Street to Kilometer 14 of Mecca Road; and Project 7/6/B, which calls for the installation of 95 km of mains and 430 km of branch lines, and for making 15,832 residential connections in the neighborhood east of the express line between Wali-al-'Ahd Street and the (Bariman) neighborhood.

That project, when concluded, would complete the Ministry of Agriculture and Water's multi-stage plan to cover Jiddah's water needs until the year 2000.

The director general of the Jiddah Water Project explained that Jiddah now has a water network of 3,424 km, that 111,743 residential connections have been completed as of January 1992, that the Jiddah water reservoir has a capacity of 119 million gallons, and that the pumping stations have a capacity of 100 million gallons per day.

RUSSIA

Ecology Minister Sees Mutual Benefit in Western Aid

92WN0521A Moscow NEZAVISIMAYA GAZETA
in Russian 6 May 92 p 6

[Interview with Russian Minister of Ecology, Geology and Natural Resources Danilov-Danilyants conducted by Dmitriy Frolov: "Russia Has Found Itself in Ecological Time Trouble"]

[Text] Western aid is necessary for us and as well as for the West, believes Russian Minister of Ecology, Geology and Natural Resources Danilov-Danilyants.

"...If a wave washes a shoreline cliff into the sea, there will be less of Europe..." These words of the 18th Century English poet John Donne, aside from all else, may serve also as an excellent description of the global importance and interdependence of ecological problems. Evidently, many Western ecologists and the circles close to them adhere to this same viewpoint when the topic of conversation turns to the catastrophic ecological situation on the territory of the former Union, and of Russia in particular. The interview with the Russian minister of ecology is to be published in the next issue of the World Media international newspaper pool, which also includes NEZAVISIMAYA GAZETA.

[Correspondent] Viktor Ivanovich, it will soon be six months since you assumed the office of minister. Has your understanding of the ecological situation in Russia undergone any significant changes during that time, and has this situation not actually turned out to be worse than we might have expected?

[Danilov-Danilyants] Since about 1990, the access to information of this type has become quite unrestricted. I have worked on resource and environmental protection problems for 15 years. I was not a novice and had a rather adequate understanding of the matter. In any case, all the new information corresponded rather well in its totality.

[Correspondent] The totality, we may presume, is most gloomy?

[Danilov-Danilyants] That is specifically correct. Thirty-five cities in Russia have entirely unacceptable air pollution indicators. If we drop the word "entirely", then there will be from 65 to 110 such cities. And these are not some provincial towns, but large industrial and administrative centers, including also the capital. In many places the pollutants seem to be superimposed upon each other: Transport gives off nitric oxide; metallurgy gives off sulfur dioxide and benzopyrene; chemistry gives off formaldehydes, phenols, and aromatic hydrocarbons. The combined effect of this bouquet is menacing, and the residents of such cities as Kemerovo, Nizhniy Tagil, Sverdlovsk, Perm, Chelyabinsk, and Saratov suffer immensely from it.

Most of the water reservoirs are also in an unacceptable state. The Volga is no longer a great Russian river, but by analogy with the Danube, which is called the cesspool of Europe, it fully deserves to be called "the cesspool of Russia." The Lagoda, Onega, Neva, North Dvina, and practically all the rivers of the Urals are polluted. The Bering and Karsk Seas have become a burial ground for spent nuclear reactors, and we need not speak of favorable radiation conditions there. In general, radiation contamination is our most severe ecological illness: Chernobyl, Kyshtym, and tens of oblasts with poorly controlled nuclear storage facilities.

[Correspondent] The list of our ecological troubles may go on and on, it seems. What means would be necessary, in your opinion, in order to if not eliminate then at least localize all this?

[Danilov-Danilyants] If we are speaking in a monetary expression, it is very difficult to give such an evaluation. How, for example, can we evaluate the disappearance of a biological species or the loss inflicted upon the gene pool? Of course, we may count up the destroyed forests, the hospital admittance forms, the losses from metal corrosion, but what we get will be far from the truth.

As for localization, this really is a serious problem, since we are posing an ever greater threat to our neighbors. This is not necessarily a catastrophe of the same scope as Chernobyl, when tens of foreign radiation control stations registered a surge in the radiation background. For example, the primary source of air pollution in Scandinavia from which Norway, Finland, and to a lesser degree Sweden suffer is sulfur dioxide produced by our "Pechengonikel" and "Severonikel" combines. The Finnish firm Outokumpo has proposed a project for their reconstruction which costs \$640 million. Of this amount, Finland and Norway are willing to pay \$100 million, and the rest will be granted as credit to be repaid by the combine's production. Economic accounting has shown that the combine will not be self recoverable under these conditions. I posed the question of seeking additional sources of financing to the ecology ministers of these countries and, judging by all, they are ready to do this.

[Correspondent] Thus, while before we spoke of international ecological cooperation, today it makes sense to speak of Western ecological aid. How might it be expressed?

[Danilov-Danilyants] Primarily through investments, technologies, know-how, and to a lesser degree consultations and training. Most unfortunately, everything is happening backwards. In Russia today there is a shortage not of brains, but of money. In order to correct the situation, we need large investments for the drastic transformation of numerous enterprises, since expenditures in the early stages of the technological process are the most effective. When you already have a mountain of trash and poisonous gas is blowing, it is already too late,

and the construction of additional purification structures is an ineffective direction which must be used in emergency order and in the most extreme cases.

Ecological programs must be coordinated with the other commercial activity of foreign firms on our territory. We must offer them various incentives for agreeing to finance such programs, and not at their own facilities, which is mandatory under their contract, but in other spheres which are not directly associated with them.

Western aid is necessary not only for us, but for the West itself. Today there is serious and justifiable concern about the prospect of global warming, which promises nothing good for mankind. It is occurring due to the accumulation of hothouse gases—primarily carbon dioxide arising in the process of fuel combustion—in the atmosphere. And it turns out that it is profitable for all the developed countries to spend funds not for the reconstruction of their rather clean industry, but for... planting forests in Russia. Forests absorb carbon dioxide, and one hectare will absorb more carbon dioxide than the amount by which it could be reduced if the same money were invested into the reconstruction of even the worst enterprise in any developed country. Moreover, except in Russia, there is nowhere else to plant forests...

[Correspondent] Will we be able to save our own ecosystem by ourselves, if for some reason the aid is not given?

[Danilov-Danilyants] All the data obtained in recent years makes me inclined to believe the answer to this is no: Perhaps even we will not be able to. Irreversible changes in the natural systems and in the gene pool will occur faster than the economy developing without Western aid can gain enough strength to restore nature. Nature cannot wait, and if things proceed at the present rate, in one generation there will simply be no one to carry this burden. We have found ourselves in ecological time trouble, and have received a blow from the direction which is most difficult to deflect, and about which we thought least of all.

[Correspondent] In the West they are talking with ever greater alarm about our nuclear power plants. In your opinion, are they compatible with ecological safety?

[Danilov-Danilyants] I visited the nuclear enterprises in Germany. From the standpoint of safety, everything looks rather convincing there. However, in our country I would not insist on further expansion of nuclear power production at the currently achieved technical level—from the standpoint of an ecologist, this would be thoughtless. Evidently, the question should be answered in this way: Compatibility of nuclear technologies and ecological safety is a matter for the near future. However, I consider any reconstruction of the Chernobyl-type reactors (RBMK) [high-power fuel-channel-type boiling reactor] to be totally unacceptable, and the 16 existing ones should be shut down.

[Correspondent] Are our VVERs [water-cooled water-moderated atomic energy reactor] better than the RBMKs?

[Danilov-Danilyants] We must take a long look at the VVERs. But in any case, we must compensate the loss of electrical energy from the closure of nuclear power plants by reconstructing our monstrously energy-consuming production.

INDEX OF ECOLOGICAL PROBLEMS

- a - atmospheric pollution (chemical, mechanical, thermal)
- b - depletion and pollution of ground waters
- c - pollution of the seas
- d - deforestation (overcutting forests)
- e - degradation of forest masses with anthropogenic effect
- f - degradation of natural fodder crops
- g - depletion of fishing resources
- h - accelerated soil erosion
- i - soil depletion
- j - secondary salinization of soils
- k - soil contamination (chemical)
- l - intensive ravine formation
- m - disruption of permafrost ground soil conditions
- n - comprehensive disruption of land by mining excavations
- o - loss of productive lands (alienation of agricultural and forest lands)
- p - decline and loss of natural-recreational qualities of the landscape
- q - radiation contamination of the territory

ECOLOGICAL DISASTER ZONES (WITH INDICATION OF SETS OF ENVIRONMENTAL PROTECTION PROBLEMS)

[Numbers refer to map presented above; letters refer to ecological problems listed above]

- 1 - Aral Sea and regions surrounding it (b, i, j, k, a).
- 2 - Chernobyl Nuclear Power Plant accident zone (q, a, b, k).
- 3 - Don Basin (n, a, b, o, k, l).
- 4 - Dnieper-Krivorog industrial region (n, a, b, o, k).
- 5 - Moldova (k, j, l, o, a, b).

**LEGEND:**

Shaded areas—Regions with most acute ecological situation

4—Ecological disaster areas

Map prepared at the Russian Academy of Sciences Geography Institute

6 - recreation zones along the shores of the Black Sea and Sea of Azov (b, c, a, p).

7. North Caspian region (n, b, c, g, j, k, i, a)

8 - Kalmykiya (f, i).

9 - Central Volga region and Prikamye (b, n, h, l, a, d, e).

10 - Kolskiy Peninsula (n, b, a, e, f)

11 - Urals industrial zone (n, a, b, k, o, e).

12 - Kuzbass (n, a, b, k, i).

13 - Baykal (b, a, g, e, l, m)

14 - Moscow region (a, b, o, k, e)

15 - Fergana (a, b, n, o, j, i, k)

16 - Ust-Kamenogorsk rayon (n, a, b, l, o, g).

Government Seeks Joint CIS Efforts To Protect Ozone Layer

LD0506154192 Moscow ITAR-TASS in English 1042
GMT 5 Jun 92

[Text] Moscow, June 5 (TASS)—Russia will call on all former Soviet republics to join efforts in protecting the ozone layer, according to a governmental resolution issued on Friday.

The government authorised the Foreign Ministry to hold negotiations with CIS member-states, as well as with Georgia, Latvia, Lithuania and Estonia on a possible joint fulfilment of commitments pledged under the Vienna convention on the protection of the ozone layer and the Montreal protocol on substances destroying the ozone layer, the document said.

A special commission will be created to coordinate the activities of various Russian ministries and organisations in protecting the ozone layer. Viktor Danilov-Danilyan, minister of ecology and natural resources, will chair the commission.

The government authorised all ministries, involved in implementing the task, to work out a state programme of ozone layer protection in three months.

Atomic Energy Minister Views Nuclear Arms Policy

PM1205133792 Moscow ROSSIYSKAYA GAZETA
in Russian 7 May 92 First Edition p 5

[Two-part article by Professor V. Mikhaylov, Russian Federation minister for atomic energy: "Nuclear Weapons"]

7 May, p 5

[Excerpts] It is of course difficult to give a full account in a single article of all the complex and contradictory aspects of the military-political, socioeconomic, and scientific problems of nuclear weapons in our country in the world as it is today.

I have written an account of my thoughts about and approach to the field in which I have worked for over 30 years, including my presence for two or three months every year at nuclear tests, excluding the last three years when I was appointed deputy minister.

I am convinced of one thing: Despite the complex contradictions that exist in our society, nothing stops our desire to proceed along the road of progress. And on this road nuclear weapons will long continue to defend our right to freely choose this road which is worthy of our people. [passage omitted]

On 27 June 1954 the world's first nuclear electric power station, with a capacity of 5,000 kilowatts of electric power, came on line in the city of Obninsk near Moscow. Before this event the great discovery of our century—the energy within the nucleus of an atom—was associated in the minds of millions of people with military uses alone. Today nuclear electric power stations generate about 16 percent of the world's total electric power output. And this proportion is rising.

On the one hand nuclear power is the only electricity generator capable of supplying mankind with energy over a long period that does not contribute to the greenhouse effect and acid rain, while on the other hand nuclear power is by its very nature unsafe for man and his environment. The danger of global contamination of the environment by radioactivity could arise as the result of the destruction of nuclear reactors in any accident or conventional military conflict.

First Tests

[passage omitted]

During the difficult war and postwar years a new industry was established. What impelled the physicists, designers, and organizers to labor selflessly from early morning till late at night in order to set up the nuclear industry? Primarily, I think, it was on the one hand love for their motherland and genuine patriotism, and on the other the natural desire to display their intelligence and talent as men. It is precisely this combination of state and personal interests that forms, in my view, true

common human values regardless of the age or the country. Today, unfortunately, these are often replaced by the pursuit of a "quick buck" at any price. [passage omitted]

Our tests at practically the same time as the U.S. ones were exceptionally significant in ensuring the national security of the Soviet Union and overall stability in the world. They completely destroyed the Americans' monopoly in the possession of nuclear weapons.

The development of atomic and hydrogen weapons marked a new stage in the history of mankind and brought to the fore a number of vitally important philosophical and world-view problems which society had not had to face before, thus raising the level of politicians' responsibility for the entire existence of life itself on our planet.

The fact that mankind had mastered the energy of nuclear reactions raised a number of multilayered and equivocal issues, but one extremely important result—mankind had crossed into a new historical era in terms of resolving military-political conflicts—this was indisputable. This is where the strength of perestroika lay, in that it noted and clearly delineated in a timely fashion the main points of this new era in human development.

Professional nuclear scientists were and are perfectly aware of the responsibility they bear to society and to peoples for keeping the sky above our planet peaceful and for ruling out a repetition of the Hiroshima and Nagasaki tragedies.

In 1953 the USSR Ministry of Medium Machine Building was formed to direct this new sector of science and technology, and in 1989 this was transformed into the USSR Ministry of Atomic Power Engineering and Industry. From the very outset this sector was established on the basis of a scientific and technical potential with a powerful production base, that is to say it represented a new type of scientific and technical complex.

Signal of Hope

The nuclear weapons development process is inseparably linked with nuclear tests in the natural environment.

Nuclear test explosions are carried out in order to develop and improve nuclear weapons for the purposes of verifying theoretical calculations relating to the basic design of a nuclear device. The precision designs of nuclear weapons also necessitate systematic checking of test specimens among weapons in storage.

From the very outset, however, nuclear testing of nuclear weapons had and continues to have a negative effect on many aspects of international life and the health and well-being of millions of people. Nuclear explosions, especially in the atmosphere and on the ground, whoever carries them out, have ultimately led to an increase in the total amount of radioactivity in our environment. The

Soviet Union resolutely stood at the forefront of the forces that supported a ban on all kinds of nuclear weapons tests as a first step on the road to stopping the nuclear arms race and the road to a nuclear-free world. [passage omitted]

Further success in limiting nuclear tests depends entirely on the U.S. position on this issue, since provided there are no delays, all the preconditions exist to develop the success that has already been achieved, primarily as regards limiting the number of nuclear weapons tests that are conducted annually, including weapons with a TNT equivalent of up to 150 kilotonnes. The transition to a quantitative limitation of tests is a qualitatively new step which first and foremost requires a definition of the concept of the minimum TNT-equivalent threshold for a genuine nuclear explosion, bearing in mind the technical potential for verifying this, that is to say a definition of the term "nuclear explosion."

A mechanism for verifying the number of nuclear tests could be implemented on an extensive international basis—which is very important—by grouping national verification systems into international systems and by carrying out inspections at sites where explosions are carried out.

To this end I believe it is important that international agreement should be reached in the near future on criteria for safely carrying out underground nuclear explosions and on verifying the implementation of these criteria on nuclear test sites and beyond.

Today the cessation of all nuclear tests is of key importance in preventing the development of third-generation nuclear weapons or so-called directed weapons, in stopping this evil jinn from progressing beyond the stage of scientific research to the stage of full-scale designs that will give a new twist to the nuclear arms race. These are weapons with qualitatively new parameters in terms of safety in peacetime and effectiveness and target strike reliability in wartime. On the one hand these weapons should be hundreds of times less dangerous than existing ones as regards overall radioactive contamination, and on the other they are able to hit strategic enemy targets both in space and on earth. It is precisely this aspect that is causing alarm, since some overly ardent hotheads could be tempted to use them in any local conflict. And it has not been ruled out that with the development of third-generation weapons there will be a move away from a policy of "deterrence" to one of "intimidation."

In this connection it is worrying that second-generation nuclear weapons could be destroyed on treaty principles under the strictest international verification while the West, it seems, will achieve success in developing third-generation weapons.

Today nuclear weapons are primarily a means of maintaining overall political, military, and economic stability on our planet, regardless of whether the countries that possess them are confronting one another in any sphere.

The only alternative to nuclear equilibrium and a deterrence strategy is a regime of complete trust, complete openness, and a general and complete ban on nuclear weapons and the design of nuclear weapons. This is our goal.

We need to proceed toward this goal along all possible roads: Official and people's diplomacy, including the "green" movement, cultural and scientific exchanges, development of trade and joint enterprises, and so forth. At the same time we must strive to achieve international agreements regarding a step-by-step maximum possible reduction in the number of nuclear weapons. It is important to highlight those aspects that inherently encourage the emergence of mistrust or aggressiveness.

Unfortunately, until such time as all measures to eliminate nuclear weapons and thwart opportunities for designing them in any country in the world yield a noticeable result, our Commonwealth is obliged to maintain its defense sufficiency.

Together into the Future

Together with a number of countries in the world we have an opportunity to strengthen the collective security system in the near future, bearing in mind the unique historical situation.

At the present time, in conditions of new mutual understanding and full-scale steps in matters of cooperation, there is in fact a colossal military machine in the world that poses a direct material threat, not just a hypothetical one. The degree and nature of external military threats is changing as time goes by, but at every stage the Commonwealth's security status should match the realities of the world as it exists.

However, unchallenged speeches regarding the complete cessation of nuclear tests in our country made by public figures on radio, on television, in the press, and from the rostrums of Supreme Soviets, as well as rallies and meetings of various social organizations, are molding public opinion on the need for further unilateral steps.

There is no doubt that most authors have the sincerest intentions of saving mankind from nuclear disaster. However, in recent years the center of gravity in the struggle for universal nuclear disarmament has abruptly shifted in our country in the direction of actual unilateral nuclear disarmament. After all, nuclear weapons today, bearing in mind all the consequences of using them, are primarily a weapon of global politics. A chorus of social commentators is drowning out the voice of the professionals in an area where competence and carefulness are particularly important. The mass media are basically not letting specialist professionals have their say, and open slander, fabrications, and demagogic speeches often remain unanswered. Erroneous judgments masquerade as facts, and the effect of environmental factors unconnected with radiation is passed off as being due to the effect of radiation.

Incidentally, Soviet journalists did not attend the U.S. explosion in Nevada under the joint verification experiment, although they were officially invited to do so. A situation has been created in our country in which it is thought patriotic and progressive to express any criticism of Soviet nuclear weapons and test sites. And as always happens in cases such as these, a number of public figures are exploiting the situation to boost their own popularity, occasionally appearing in the role of stage managers of mass demonstrations.

We are all striving to put our own house in order, but not everything is going smoothly for us at the moment. There are many examples of this at every stage. Our house is not alone on the planet, we all live in a complex and dynamic world. In an age of nuclear and space technology, the space and time of this world have shrunk to the limit for each house.

There are still many areas of the world with an unstable political situation, extremism, and an aggressive atmosphere, including those directly on our borders. Certain "other countries" are working intensively to develop nuclear weapons. So a nuclear potential that was established when our country was going through hard times, and the maintenance of this potential at a modern scientific and technical level, is a guarantee of the stability of peace on our planet.

By cutting nuclear weapons we can retain immeasurably more resources for the needs of the national economy than we can by unilaterally banning nuclear tests—the foundations of the country's scientific, technical, and military potential—until such time as we achieve a universal ban on nuclear tests. It should be stressed that for all the importance of effecting unilateral disarmament measures, it is extremely important not to take the final step into the abyss, toward processes that are irreversible. It is far more difficult to prevent unique collectives of highly skilled professionals from slipping into decline than it is to destroy everything. Right now it is far simpler, given the extremely complex social and economic situation, to demand that our country take ever greater unilateral steps. Was it really any easier for us in the postwar years, when we were building up our nuclear industry? But today, frankly, a high level of civic courage is needed in order to retain, despite the situation that has developed with regard to our country's nuclear laboratories and test sites, a high degree of responsibility and patriotism, and not to yield to the temptation of short-term profit for the collectives of workers, engineers, and scientists when resolving issues to do with preserving nuclear potential at all stages of disarmament.

The transition to defense sufficiency is now closely linked with the reorientation of the entire Soviet military-industrial potential toward qualitative parameters in terms of weapons based on the achievements of modern science and technology.

Processes of bilateral disarmament, in which considerable successes were achieved during the perestroika

years, are logical in realizing the blueprint for reasonable sufficiency for the country's defense. In this process the first steps on the road to nuclear disarmament are particularly significant—the elimination of medium- and shorter-range missiles, i.e. the INF Treaty, and the Strategic Offensive Arms Reduction Treaty which has been signed (the START Treaty).

At the end of September 1991 and January 1992 Washington announced large-scale cuts in U.S. nuclear forces. I am convinced that these steps taken by U.S. President G. Bush will be supported by our people and our leadership, since they are in keeping with the essence of the policy of perestroika. The reciprocal steps and counterproposals made by our country and Russian Federation President B.N. Yeltsin are a distillation of the efforts we made during the perestroika years on the road to a new world. All this is the result of the new political thinking and the nuclear age.

In this regard, when the two largest nuclear powers agree to reduce their nuclear arsenals, the nonproliferation of nuclear weapons should become the main factor on the road to a nuclear-free world. Within the framework of the 1968 Treaty on the Nonproliferation of Nuclear Weapons, the agreements reached in 1974 and 1984, and the 1987 Convention on the Physical Protection of Nuclear Materials, it would be advisable to formulate national measures for controlling relevant deliveries and technologies in the reformed Commonwealth while keeping the Russian nuclear weapons complex intact as a national asset belonging to the people for the purpose of tackling these aspects of military-political problems as well. Russia should become the only nuclear power and the legal successor to the former Union. One nuclear power, like it was before, and not two or three—this fulfills the aspirations of those who are fighting for a nuclear-free world.

[8 May, p 4]

[Text] In 1946 a national laboratory was created, the so-called Laboratory No. 2, for the development of nuclear weapons, and the talented engineer General P.M. Zernov was appointed its first director. Now that laboratory, the All-Union Scientific Research Institute of Experimental Physics, is located on the border of Nizhniy Novgorod Oblast and the Mordovian Republic, and is basically a city with a population of 100,000.

Our second national nuclear weapons development "laboratory" was created on the shores of Lake Sinara in Chelyabinsk Oblast in 1955, and its first director was the important engineer D.Ye. Vasilyev. The city and the institute—the All-Union Scientific Research Institute of Technical Physics—were created simultaneously.

In a relatively short space of time these institutes grew into major scientific centers.

These are basically major science and production centers where science, design, and production form a single,

indissolubly linked cycle and where unique experimental, computer, and production facilities have been created. The activity of these institutes played a decisive part in ensuring the nuclear weapons equilibrium between the USSR and the United States, and in recent years also as regards test verification measures at bilateral talks. These institutes' potential makes it possible to tackle major scientific and technical problems attendant on nuclear disarmament processes in the context of the need to ensure defense sufficiency at each stage of disarmament.

The proportion of scientific research and developments at the institutes in spheres without a military application totals around 25 percent, and is showing a tendency to increase. Some of these developments are already being widely applied in the national economy.

Strict Regime

The country's best specialists were selected for work in these institutes. I will say frankly that life in these cities was difficult, because of the strict regime of access for friends and relatives. We all accepted this, because the work was important. The defense of the Motherland's borders was always regarded as one of our people's glorious traditions! But today these mighty heroes have difficulty buying rationed matches, salt, and all the other things that are essential to basic survival. One in five institute workers is in a waiting line for housing. The average wage at these institutes in 1991 was around 450 rubles [R] a month, and for one worker in seven it was less than R250 a month, which is below the minimum living wage. The 90 percent increase in pay from January 1992 does not solve the problem of existence for them, in the context of free prices. If you take into account the particularly difficult working conditions, often involving a risk to life, and the difficulties of everyday life in closed cities, you can imagine these people's desperation, their heartfelt cries. In January of this year a meeting took place in the Kremlin between leading scientists and Russian President Boris Nikolayevich Yeltsin. We were waiting for such a meeting throughout the perestroika years. In this complex and difficult time for Russia B.N. Yeltsin gave us a whole working day. There was a thorough discussion of all aspects of the nuclear weapons complex. I was very pleased with this meeting and the concern shown for our workers.

The creation of nuclear weapons requires the participation of major scientists. A major scientist is not going to work in a closed city unless suitable conditions are created for his life and work. And young people today will not go and work in such conditions. For instance, today the average age of engineering and technical staffers at the All-Union Scientific Research Institute of Experimental Physics is 44, and the average age for the institute as a whole is 42.

It must be particularly noted that the prototype weapons that are developed and manufactured for dispatch to the nuclear testing range are naturally a source of danger. It

is therefore extremely important to restrict access to closed cities for people not involved in this work.

In recent years the situation regarding developing, improving, and maintaining the combat capability of nuclear weapons has become considerably more difficult in our country. Finance and material and technical provision for the work of weapons institutes have deteriorated sharply, to such an extent as to call into question the possibility of further work on nuclear weapons in the country, including work to increase their safety. The development of experimental, testing, and production facilities has virtually stopped, virtually no funds are being allocated for replacing obsolete equipment, and housing construction has been cut back considerably.

Thus the national laboratories' real expenditure on research and development in 1991 was 40 percent down on the 1990 figure, both by virtue of the reduction in financing and by virtue of the increased cost of materials and subassemblies and the maintenance of the social sphere. Although 1992 has come, the question of finance for this year has yet to be resolved. The most highly qualified and energetic scientific staffers, designers, and workers have been forced to stop work in the weapons area and move to cooperatives or small enterprises, thereby losing their scientific and professional potential.

In this situation Russian President B.N. Yeltsin's visit to Arzamas-16 in late March was extremely important. This was the first time in the entire history of this national nuclear center that the country's leader had visited our nuclear specialists. There was a thorough and businesslike discussion on preserving the sector's scientific and technical potential in the context of the conversion of military production.

Today the country's nuclear weapons complex, which includes nuclear fuel production plants, nuclear munitions manufacturing plants, and scientific research institutes, employs more than 100,000 people, and more than half a million people live in cities which are closed in terms of their security and secrecy conditions. This entire complex is located in Russia. The enterprises' fixed capital, built up over 45 years, totals something like R4 billion. Deterioration as of today is more than 50 percent. According to our estimates, the similar complex under the Department of Energy in the United States has fixed capital worth more than \$15 billion, with a work force of a fairly similar size. In the next 20-25 years the Americans intend to renew their nuclear missile complex, making provision for substantial financing (up to one-third of total expenditure) to safeguard the employees' health and protect the environment. One of the U.S. Administration's basic goals is the qualitative improvement and modernization of the nuclear weapons complex as the basis of military-strategic potential, in order to successfully fulfill the strategic defense initiative (SDI) program and create a new generation of nuclear weapons.

In these conditions, naturally, nuclear weapons should remain the basis of national security for our country and for the world in general. As of today I am convinced that the basis of world stability and of the nature of economic relations is mutual understanding between Russia and the United States.

Serious efforts are now being made by the world community aimed at halting militarization processes and eventually designed to demilitarize the world community, but the world we live in today is entirely a militarized world.

In 1990 we drew up an outline plan for the development and modernization of enterprises engaged in the development, testing, and production of nuclear munitions until the year 2010. The total expenditure of capital investments on this modernization program amounts to some R0.7 billion a year. In the conditions of a real reduction in nuclear arms, this outline plan devotes particular attention to radically reequipping institutes and plants in the light of the increasing conversion of military production. Enterprises' fixed capital is not now in line with modern technical and ecological requirements, or with the new concepts of safety in the production, storage, and transportation of nuclear materials. This 20-year program envisages, in particular, the following items of expenditure: R3 billion on personnel safety enhancement, environmental protection, and the burial of radioactive waste; R3 billion on the development of enterprises' computer capacities, where there is a colossal lag in relation to the United States; R2 billion on the renewal of experimental and diagnostic facilities; R1 billion on the mothballing of existing reactors for the production of plutonium and tritium; and R1 billion on the creation of facilities for stockpiling active nuclear materials obtained from the dismantling and destruction of nuclear munitions.

The fulfillment of this program will make it possible to react flexibly to trends in the world community in the sphere of nuclear disarmament, and will increase the technological level of conversion operations.

We have stopped the production of weapons-grade uranium. By the year 2000 all 13 industrial reactors for the production of new plutonium will be eliminated (today four plutonium production reactors are in operation, and by 1996 only two will be in operation).

The outline plan for modernization makes provision for budget financing of the modernization and development of enterprises allowing for an increase in conversion operations to 60 percent by the year 2000, including ecological recovery of territories, the creation of fiber-optic equipment for television and communications, the development of radioisotope and nuclear medicine, the creation of highly durable tools and high-precision machine tools for the processing of complex structures, the creation of new compound materials, the production of mobile laboratories for ecological analyses of the environment, the production of promising high-purity

materials, and so forth. In a number of spheres, associations have already been set up on the basis of science and production facilities, and I think the formation of joint-stock companies is on the agenda.

Today, an average of some 30 percent of the science and production capacities of the nuclear weapons complex are already working for the national economy, of which some 5 percent is directly involved in consumer goods production. It is planned to double consumer goods production by 1995. It is planned to produce the scarcest, high-tech goods, such as digital video and audio recorders, laser disc players and discs, microwave ovens, electronic security locks, and many other goods in high demand. Centralized state investments are also needed in this sphere. Centralized coordination of conversion operations in the nuclear weapons complex is one of the main conditions for ensuring the nonproliferation of technologies developed in the complex—a very sensitive and crucial state problem. Attracting foreign investments will also do much to determine the success of this conversion program and the time scale for its implementation.

The current costs of maintaining the nuclear weapons complex have cost us R10 a year for every one of our compatriots. R10 each a year!—that is the price of our independence and our dignity. Every one of us has given less than R1 a month to maintain the country's nuclear potential.

I think it is necessary today not only to materially support this sector, the country's pride, but also to ensure social protection of their work and life. The benefit derived from these collectives for all spheres of the country's activity, both for defense and for the national economy, will surpass all expectations. Thanks to the high skills and selfless labor of scientists, designers, and workers, thanks to efficient organization of labor and high labor and technological discipline, these collectives have achieved scientific and technical results up to the best world standards. It is state support for such complexes today and the thrifty utilization of the enterprises' scientific potential and fixed capital that will ensure the country's scientific and technical progress in future.

And in our age, without scientific and technical progress there is no future for the country or the people!

The Planet's Safety

Today, while officially acknowledging that nuclear war will lead to catastrophe and that it must not happen, the United States, in its new doctrine of "deterrence," attaches great significance to improving its nuclear arsenal.

It must be observed that the West has not yet officially renounced the right to the first nuclear strike, and is continuing to improve its nuclear forces, exploiting its advantages in technology and in attaching priority to developments relating to nuclear warheads for strategic

offensive weapons, including missile complexes with individually targeted warheads accurate to within 100 meters and with the potential to destroy highly protected targets.

The doctrine of defense sufficiency and our international commitments on reducing the nuclear arsenal and non-first-use of nuclear weapons affect the composition [sostav] of nuclear weapons and require qualitative improvements.

The research physicists have always devoted particular attention to questions of the safety of nuclear weapons in production, storage, and handling, first and foremost through the development of physical designs for the structure of nuclear weapons which rule out in principle the possibility of a nuclear explosion in any unauthorized circumstances.

Enhancing safety is today the priority objective of the nuclear weapons program. Technical achievements make it possible to carry out major improvements as regards the safety of weapons from the moment of their creation.

Since the consequences of an accident or the deliberate theft of nuclear weapons are extremely dangerous both politically and physically, all measures have always been taken to protect them against the possibility of an unauthorized nuclear explosion or the dangerous dispersal of radioactive substances.

However, "How safe is safe?" and "What compromise should be reached from the viewpoint of military characteristics and the further enhancement of safety?"—these are highly complex questions where nuclear weapons are concerned. The safety problem has always been dealt with on the basis of military-political doctrine. Today the world is changing, and the main aspects are shifting in the direction of safety.

It is necessary to stress the exceptional complexity of the problem of the safety of nuclear weapons complexes and the need for analysis using three-dimensional models, with the closest possible approximations to a nuclear explosion.

A nuclear warhead itself is a complex, I would say unique, technical device combining modern electronic devices and generators, nuclear-active materials, and conventional explosives. The operation of these devices is synchronized to 100-millionth parts of a second in an automated system according to control commands. Naturally, the service life of such devices is limited, as with any other highly complex electronic equipment.

In the process of designing nuclear weapons, it is necessary to deal with their real three-dimensional geometry. As of today the potential for high-speed operation of our latest supercomputers does not allow us sufficiently accurately to describe all the development processes of hydrodynamic and neutral processes.

And then, in the context of a nuclear explosion, it is necessary to deal with a substance at temperatures on the order of a hundred million degrees and at pressures of hundreds of millions of atmospheres, and with the transfer of heat and neutrons within the substance in a geometry that is changing at ultra-high speed, on a time scale on the order of one billionth of a second, against the background of a variable-speed fission chain reaction.

Our potential for going over from a two-dimensional to a three-dimensional model is today tens of times less than what is available in the U.S. national nuclear laboratories. However, even three-dimensional models do not to a sufficient extent describe all the sensitive aspects of the kinetics of detonation of conventional explosives and the chain reaction of nuclear fission and fusion.

The considerably smaller financial potential, the great laggardness of our laboratory and computer facilities—all this was made up for by the resourcefulness of our scientists and designers, and, most important, by a number of nuclear tests approximately equal to that of the Americans—this being the only way to obtain experimental information on the physical processes that take place in the extreme conditions of a nuclear explosion.

Nuclear tests are an integral part of scientific research, experimental, and design work. It must be noted that the United States, where the Nevada test range is managed by the Department of Energy, spends some \$500 million on nuclear tests annually, which is 10 times higher than our spending.

In the USSR underground nuclear tests were conducted at two Defense Ministry test ranges: the Semipalatinsk range and the Northern range (the Novaya Zemlya islands).

Since 1949 a total of 467 nuclear weapon tests have been conducted at the Semipalatinsk range, of which 343 were underground, and at the Northern range, beginning in 1955, there have been 132 nuclear weapon tests, 42 of them underground.

In recent years the atmosphere surrounding the activity of nuclear test ranges has deteriorated sharply. The perestroika processes in our country led to an improvement in the military-political atmosphere in the world and determined the paramountcy of panhuman values. The antinuclear movement is growing among the world public.

However, persistent demands for the unilateral cessation of tests led to an unpredictable and unstable atmosphere in connection with our nuclear tests and a steep reduction in the nuclear test program in the last six years, which has brought the nuclear weapons complex to the point where irreversible degenerative processes could begin. The physical processes taking place in a nuclear explosion cannot be simulated in laboratory conditions, and nuclear tests of nuclear weapons remain the only way to test their viability, reliability, and safety.

In this situation, guided by the objectives and principles of the ratified Treaty on the Limitation of Underground Nuclear Weapon Tests, I consider it possible to limit our underground nuclear weapon tests to only the minimum number necessary. Of course, in order to provide guarantees against unexpected political or technical events affecting the country's defense potential, it is necessary to enshrine in an international or bilateral agreement the annual minimum number of nuclear weapon tests.

Let me remind you that in 1990 the United States conducted nine tests, France six, and China two. Our country conducted one test, at the Northern range.

In 1991 the United States conducted eight nuclear tests at the Nevada test range, and France conducted six tests in the Pacific. Again, our test ranges are silent! And they will be silent until the end of 1992, if the Americans do not follow the example of our unilateral moratorium. In effect our test ranges will have been silent for two years in succession—1991 and 1992.

Following our example, in April France declared a moratorium on nuclear tests until the end of 1992. The United States has the last word, and the whole world awaits this step.

On Test Ranges and Tests

The problem of nuclear tests has such an important bearing on the scientific aspects that it is difficult not to raise them in broader terms.

The geographical location and geological structure of the Novaya Zemlya islands, unlike the region of the Semipalatinsk range, are such as to ensure the complete safety of the population of regions close to the range territory—safety from both the radiation effects and the seismic effects of underground nuclear tests with a yield of up to 150 kilotons. The peculiarities of the geological formation of the Novaya Zemlya archipelago, in view of its aseismic nature and absence of ground water, create the conditions for the complete containment of the products of the nuclear explosion within the underground reaches of the archipelago.

The distance of the range's test sites from the nearest cities, Amderma, Naryan-Mar, Vorkuta, Murmansk, and Arkhangelsk, is 250, 400, 500, 900, and 1,000 km respectively, whereas the city of Semipalatinsk is 90 km from the Kazakhstan range, while the nearest settlement to it, Komsomolskiy, with its population of 10,000, is 40 km away, that is, within the heightened risk zone of the Semipalatinsk range. Let me remind you that although the Nevada test range in the United States is 130 km from the major city of Las Vegas, with a population of a million during the summer vacation period, the actual distance to the test site is some 200 km.

Undoubtedly, during air and surface tests damage was done to the health of the population around the test range. People who suffered as a result of the surface and air nuclear tests of 1949-1962, irrespective of their

present domicile, should be on an equal footing with the victims of the Chernobyl disaster as regards benefits.

There are now certain sectors of the surface area of the test ranges which were contaminated in the course of surface and air nuclear explosions, and access to these territories should be restricted.

The switch to underground nuclear tests was an important step both in improving the ecological situation and in reducing the number of tests annually.

It is important that underground nuclear tests, given sufficient depth of emplacement of the nuclear device and durable hermetic sealing of the emplacement of the device in the ground, and given appropriate meteorological conditions at the moment of the explosion and for two or three days after it and compliance with many other organizational and technical safety measures, can minimize the ecological damage on the territory of the nuclear test range and cause virtually no harm to the inhabitants and territory of the country outside the test range. The territory of a nuclear test range usually consists of something like a few thousand square kilometers.

From the very beginning of underground tests all measures were taken to ensure that virtually no radioactive products came to the surface. The technology for containing radioactive products was constantly improved, and, for instance, during the joint experiment with the United States in 1988 the participants in the experiment and journalists were able to be present at the epicenter of a 150-kiloton explosion 45 minutes later, at the Semipalatinsk range.

The radiation safety of underground nuclear tests involves a range of technical and organizational measures to prevent accident situations or limit their consequences and prevent the population from receiving radiation doses higher than the international norms. The general algorithms of operations to prepare for a specific underground explosion at a test range in our country are analogous to those in America, as we discovered in the joint verification experiment.

In the context of the distrust of the world public and our own public toward the nuclear industry, I consider it necessary to formulate procedures for international or bilateral verification of safety in conducting underground nuclear explosions. The necessary preconditions exist in this sphere for the conclusion of an agreement or treaty on the criteria and procedures for their verification in conducting underground nuclear explosions.

In view of the above, I consider it necessary, within the framework of the CIS, to assign [zatverdit] legislatively to Kazakhstan and Russia in the Treaty Between the USSR and the United States on the Limitation of Underground Nuclear Weapon Tests, signed in Moscow in 1974, and in the protocol to it signed in Washington in 1990:

- the ending of nuclear weapon tests at the Semipalatinsk range in Kazakhstan, which has borne the brunt of nuclear tests since 1949;
- in order to ensure the sufficient defense of our country and to guarantee against unexpected political or technical events affecting the military balance: not only the preservation, but also the modernization of specific facilities at the Northern range in order to ensure verification of tests on the site of the implementation of nuclear explosions in accordance with the ratified 1974 treaty and the 1990 protocol to it.

In view of the need to maintain the country's defense sufficiency, it is proposed to conduct up to two to four [do 2-4] underground nuclear weapon tests at that range in subsequent years. Formerly we carried out an average of two underground tests a year at that range in the period 1964-1990, and in some years there were up to three or four underground nuclear tests.

Thus it is a question of reducing our test program by a factor of four, that is, from an average of 15 tests a year at the country's two ranges, to four tests. This reduction in tests, in the light of enhanced safety requirements, will make it possible to formulate new approaches both to conducting the tests themselves and to increasing the effectiveness of diagnostics of physical processes ensuing in an underground nuclear explosion.

Incidentally, you may hear it said today that the idea of continuing tests is upheld by those who earn big money and receive substantial benefits as a result. Don't believe it! This is said by people whose aim in life is not the service of the Fatherland, but political capital, money, and privileges. For the nuclear weapon testers there has always been only one privilege—that of being in the front ranks in curbing the nuclear elements.

Atomic Energy Minister Predicts Nuclear Test Moratorium Extension

PM2005111692 Oslo AFTENPOSTEN in Norwegian 19 May 92 p 5

[Trond Bo report: "Will Extend Nuclear Test Moratorium"]

[Text] Stavanger— Russian Atomic Energy Minister Viktor Mikhailov said that he is interested in extending the agreement on a moratorium on nuclear tests, if other countries follow suit. The Russians have also said yes to allowing Norwegians to visit the test site on Novaya Zemlya.

At the opening of the Stavanger conference on Russia's closed nuclear cities Mikhailov said that he is sure today that the moratorium will be extended to the end of the year and perhaps into next year. A final decision will be made by President Yeltsin before the moratorium runs out in October.

Nuclear safety, the disposal of nuclear waste, and nuclear tests were at the center of attention in Stavanger yesterday. Almost 100 delegates and a similar number of observers gathered for the first historic meeting of politicians and scientists from Russia and Western countries. Many of the delegates from Russia have not even met each other or their atomic energy minister before.

The fact that the meeting is taking place in Stavanger—outside Russia and in parallel with the celebration of 17 May [Norwegian national day]—was described by Mikhailov as proof of the changes which have taken place in Russia. A few years ago it would have been an improbable dream for top-level Russian nuclear researchers to be allowed to travel abroad and meet with Western researchers.

"The Russians are showing an openness which is unique when it comes to discussing international environmental issues. They are not so good about following things up, and they have not the resources, but we must nevertheless continue to exert pressure to have Norwegian demands met," Foreign Ministry Under Secretary of State Jan Egeland said.

In his opening address to the meeting Egeland reiterated the Norwegian demand to be allowed to visit the nuclear test sites on Novaya Zemlya. Egeland told AFTENPOSTEN that he views Mikhailov's speech as an invitation to the Norwegian authorities to exert pressure to be allowed to visit the sites. The Foreign Ministry will follow the matter up and contact the Defense Ministry in Moscow.

Today there are ten closed cities constructed around research centers and plants which produce nuclear arms, among other things.

Some 700,000 people live in these cities, which are spread throughout Russia.

According to Mikhailov, Yeltsin is planning a gradual opening of these cities as they are converted to civilian research and production. According to the plans, military production in these cities is to be halved before 1995, and Mikhailov hopes that Western industry might be interested in new Russian technology. Mikhailov said that Russia has not sold a single nuclear warhead or any enriched uranium to other countries. Now the safety at existing nuclear power stations and the safe storage of nuclear arms are being given priority. Russia will spend \$17 billion on the modernization of its nuclear power stations. Today there is no production of enriched uranium for military purposes, and four of the thirteen reactors which are used for this purpose will be shut down as soon as possible, two this year and the next two in a few years' time.

Yablokov Scores Atomic Energy Minister's Call for N-Arms Development

PM2205093192 Moscow ROSSIYSKAYA GAZETA in Russian 18 May 92 First Edition p 2

[Article by Aleksey Yablokov, Russian Federation state counselor on policy in the sphere of ecology and health protection: "We Will Frighten Everyone So Much That We Will End Up Being Afraid of Ourselves"]

[Text] It has recently been asserted, in the pages of many newspapers, that we should develop our atomic industry at least to the same extent as used to happen in the USSR—both as regards nuclear power stations [AES's], and as regards the development [razrabotka] of nuclear weapons. Here it is persistently emphasized that our atomic experts—the people who make atomic weapons and are associated with atomic power—are motivated exclusively by concern for the country's good and the people's good. "The people have trusted us, they have believed in our ability not just to create such awesome weapons, but also to exercise control over them. In my view, we have never yet abused that trust"—that is how nuclear weapon designer Radiy Ilkayev concludes an article in ROSSIYSKAYA GAZETA for 25 April 1992 under the heading "Portrait of a Nuclear Complex." And V.N. Mikhaylov, Russian minister of atomic energy, claims (ROSSIYSKAYA GAZETA, 7 May 1992) that nuclear weapons are a "defense of our free choice" of a path of progress "which is worthy of our people."

These statements by leaders of the nuclear industry are designed to convince us all of the correctness of the chosen course of developing the nuclear weapons complex. However, the development of this complex is not so much a technical problem as a political problem. No political problem can be discussed solely by a small group of specialists. I am therefore obliged not only to draw attention to contentious assertions by our esteemed nuclear experts, but also to examine a number of questions that have not attracted their attention, but are important in resolving the entire problem.

As R. Ilkayev rightly noted, atomic weapons and power are "twin brothers," with a shared history and a shared radiation danger to all life. And basically with shared economic and philosophical problems. Elitism and secrecy have always characterized people working in the nuclear weapon complex. But what is far more important is that their actions have immeasurably greater significance for the future of mankind than the edicts of the most formidable dictator (the price of the actions of a few people at Chernobyl was the ruined lives of many millions!). That is why, in theory, atomic experts should have no right to make mistakes. Unfortunately, experience shows that atomic experts, like the rest of us, can make mistakes, can be wrong, and can even tell trivial lies, dragging all of us into an even more terrible, planet-wide Chernobyl.

The designers of the famous RBMK reactors deceived us when they claimed that AES's with these reactors are

safe. But they knew about the dangers! And they still insisted on building them. They know that even now we have no safe reactors. But again they insist on continuing to build AES's. They know that the problem of the burial of radioactive waste has not been solved, that when the life of an AES is over, dismantling it and reducing it to a "green field" costs the kind of resources that we are not going to have in the foreseeable future. And they still insist on the development of the nuclear power industry.

For the record: Before an AES whose life is over can be dismantled, it has to be mothballed for decades. Throughout the period of mothballing, apart from duty specialists, the AES also needs heat and electricity. After that, when just one reactor is dismantled, it will be necessary to remove elsewhere and to bury some 40,000 tonnes of metal structures and 400,000 tonnes of concrete. The designers know that if all this work, plus expenditure on the burial of radioactive waste, is added to the cost of the AES, cost recovery will prove mythical. They know that, yet they insist on building them, deferring the solving of all these problems to future generations of Russian people. Are we morally entitled to do this? Are we entitled to let the jinni out of the bottle if we do not know how to put it back in?

A few years ago, as one of a group of experts, I visited the South Ukrainian AES. We asked the director how often there are failures [nedoladki] in their operation. The answer was simple: It does not happen. But someone had the bright idea of asking why bonuses were paid to groups of maintenance workers whose names appeared on the honor board. And the director had to admit publicly that failures occur regularly and have to be heroically eliminated, for which bonus payments have to be made.

The atomic experts' lie was also heard in the summer of 1989 at parliamentary hearings on the Kyshtym accident of 1957. Are all the people irradiated during that terrible explosion of radioactive waste at the Chelyabinsk "Mayak" combine being kept under medical observation? Yes, we were told, all without exception. And the results of these observations, formulated in graphs and tables, were not at all terrifying. At that time we, the members of the Ecology Committee of the former USSR Supreme Soviet, did not yet know that a significant proportion of the irradiated population had been forcibly shipped out and dispersed across the country.

Our nuclear experts' utterances are striking for their unshakable conviction that they are right. This conviction does not allow them to examine their own problems objectively.

For example, the "hottest" issue at the moment is that of nuclear tests. First they tell us that the question of continuing tests is a political one. Then they say to us that the tests are necessary from a purely technical viewpoint (as a safety check). Finally, V.N. Mikhaylov clearly contradicts this when he writes: "Of course, in order to provide guarantees against unexpected political

or technical events...it is necessary to secure by international treaty an annual minimum number of tests..." No matter whether a political decision is made, whether new techniques are found for monitoring [proverka] safety—in any event, our nuclear experts must have guarantees that tests will continue! Why so? In order to "prevent the decay of unique collectives of highly skilled professionals." How does this approach differ from the much maligned departmental approaches? On the basis of this principle decades were spent constructing bigger and bigger power stations and digging grander and grander canals—to avoid dispersing the established collectives of construction workers!

Maybe the time has come to tell our outstandingly gifted nuclear experts: "Thank-you, my friends, you have done the important job well, now venture into other areas!" In fact, it appears this process has already begun. As is known, the most active and skilled cadres are quitting the development of nuclear weapons. Indeed, need we fear "irreversible decay," or, rather, the fundamental restructuring of our nuclear weapons complex, if the weapons we already have can destroy the entire world population many times over?

The claim that verification [kontrol] techniques need to be improved is extremely controversial. As an analogy I would remind you of the long debate about monitoring [kontrol] bacteriological weapons production. In the end it became clear to everyone that the process was unmonitored. So a solution was found: Under a 1991 law actions of that kind became a **criminal offense** in the United States. This outstandingly important legal act marks a new era in legal relationships, and maybe even a new stage in the history of mankind: a national representative authority's recognition of a global level of responsibility.

V.N. Mikhaylov talks of the possibility of "safe" underground nuclear explosions. There is no such thing. Not just because we do not know all the consequences of nuclear explosions (radiobiological, geophysical, climatic, hydrogeological, and others). When nuclear devices were detonated above soldiers near Orenburg in the fifties and hundreds of other nuclear devices were exploded in the atmosphere at the Novaya Zemlya and Semipalatinsk test sites, even the most eminent scientists claimed at the time that all the consequences were already known. We now know they were mistaken: Many future generations will suffer the consequences of these explosions.

There are still those who think nuclear explosions deep in the permafrost are safe. But how do you explain the cases of leukemia in children in the Vilyuy basin? You need only look at the map of geophysical contours of the series of nuclear explosions in the seventies on Russian territory to see that the effect of a single explosion is traceable over a distance of several **thousand** kilometers.

We are assured that "nuclear tests are the basis of the country's scientific and technical potential." In my view,

this claim is an insult to the country that gave the world Dokuchayev and Vernadskiy, Pavlov and Mechnikov, Timofeyev-Resovskiy and Krylov, Tsiolkovskiy and Vavilov, Shubnikov and Karpinskiy, Zhukovskiy and Lyapunov. And many other thinkers whose pupils in fact comprise the scientific and technical potential that will provide for the future development of agriculture, medicine, biotechnology, and the national economy in general, and not only its military sector.

Let us be honest and admit that the nuclear jinni attracts our attention because it has in it a power that is mysterious to man, that he has not mastered. As a scientist, I am well aware that the human learning process is infinite and there is no task more magical for the researcher than that of stepping into the unknown. But in the case of nuclear tests we have reached the point where the researcher has to stop. This has to be done not just for political and ethical reasons (as A.D. Sakharov did, for example), but also for economic reasons. After all, it costs several billion rubles per year to continue nuclear tests. And the nuclear explosions do not mean that there is more on the shelves; in fact, there is less.

V.N. Mikhaylov's position as head of our nuclear weapons complex gives rise to a whole series of serious political, economic, and ecological questions. For example, how is one supposed to read, for example, the claim that "nuclear weapons are today first and foremost a means of maintaining global...economic stability"? Why is the prohibition of nuclear weapons development an "alternative to nuclear equilibrium"? How can one use the existence of unstable political regions and aggressive neighbors as justification for the need to use nuclear weapons? And how is one supposed to take the thesis of the possible continuation of nuclear explosions **outside** the nuclear test sites? Are we actually going to revert to the practice of nuclear explosions for so-called peaceful purposes—in Yakutia, near Astrakhan, Orenburg, Irkutsk, Chita, Naryan-Mar, Tomsk, and Kostroma? Finally, why, if we regard nuclear weapons as a deterrent factor, must we endeavor to create more and more new versions of them, including "ecologically cleaner" ones? You would think that the "dirtier" and more awesome the weapon of deterrence, the less willing any aggressor would be to start a war. Indeed, there would be no winners in such a nuclear war. Let the Americans (if they have the spare billions of dollars) invent ultra-accurate and ecologically cleaner nuclear munitions. Our hundreds of ecologically dirty and not particularly accurate nuclear weapons may be sufficient to deter anyone.

I must not ignore two political aspects of V.N. Mikhaylov's article which are important for an appreciation of my opponents' logic. In the first place, they make no distinction between Russia and the USSR. The Russian minister writes about cutting the program "from 15 tests per year on average in the country's two test sites to four tests." But on the territory of my country—Russia—there is only one nuclear test site, and in 1964-1990 on average two tests per year were carried out there

by the former Union departments. Now the minister is proposing doubling the number of tests on the territory of Russia!

Second, the Russian Federation has not yet conducted a single nuclear test of its own. Nuclear tests used to be conducted by the USSR Defense Ministry and USSR Ministry of Medium Machine Building. The fact that Russia is the USSR's legal heir does not at all mean that we have to work on all the strategic military programs the Union was working on.

Does the Russian president have to assume the awesome responsibility of starting Russian nuclear tests? I would add that, as far as I know, there is as yet no legislatively approved mechanism for authorizing nuclear tests. In the USSR this mechanism comprised a decision by the CPSU Central Committee Politburo and the mysterious Military-Industrial Commission. In the United States this principled decision is made by parliament. Our parliament has so far kept out of the political discussion of nuclear strategy issues.

Let me sum up. The USSR nuclear weapons complex must not be revived in Russia unaltered. Its program needs to be not just cut, but radically revised. The president, parliament, and government must decide whether we really need new types of weapons? In the conditions of our disbalanced economy can we satisfy the research interests of some of our scientists by conducting ultraexpensive nuclear explosions? Are the nuclear weapons we already have not enough to deter all and sundry for many, many years to come?

We have to know why we or the United States need to create new nuclear weapon systems. Maybe to threaten one another or other countries? If it is not for this, but for "technical progress" and for the purpose of developing scientific thought, then is it not better to do all this in conjunction with the United States, France, Britain, China, and the other nuclear countries? It would certainly be cheaper and safer for all countries, and progress would be far more significant.

Finally, all the aforesaid should not be seen as an appeal for unilateral nuclear disarmament and the destruction of our nuclear defense complex. All I am calling for is an end to the development of a third generation of nuclear weapons that is politically meaningless in the modern world, and thus for an end to the new round of the arms race, which only benefits military-industrial circles, not states and peoples—Russia, the United States, and others.

Yablokov on State of Russia's Ecology

*PM0705160692 Moscow NEW TIMES in English
No 14, Apr 92 pp 11-13*

[Interview with Aleksey Yablokov, Russian Federation State Counselor for Ecological and Health Policy, by

Arkadiy Dubnov; date, place not given: "Aleksey Yablokov: 'The Threat of Ecological Disaster Is No Secret to the President'"]

[Text] The Russian Federation's State Counsellor for Ecological and Health Policy Interviewed by Arkadiy Dubnov of New Times.

Thousands of containers with radioactive waste and several atomic subs are buried in the Kara Sea. To make this sinister picture complete, add to it the situation which has arisen after the Komsomolets atomic submarine accident. Unlike all the other Soviet submarines, it had an all-titanium hull. As to the reactor body, it is made of steel. When a submerged submarine is in one piece and properly pressurized, titanium and steel are separated. The accident resulted in the decompression of the hull—an analysis showed that the submarine had hit the bottom at great speed, which is also evidenced by the photographs taken there. In seawater, titanium and steel formed a electrolytic couple.

[Correspondent] As far as I remember my school physics, one metal becomes the cathode in this case, the other metal, the anode, and salt-water, the electrolyte.

[Yablokov] Quite right. This triggered the process of electrolytic dissociation, with the metals corroding, and the submarine hull and the reactor body crumbling. There have been cases of titanium barges with hulls 1.5 cm thick, moored at iron wharves, merely sinking in a year's time owing to their "rapidly dissoluble" hulls having formed a titanium-iron electrolytic couple.

[Correspondent] What does the military have to say on that score? It is supposed to know about this danger. Hasn't it taken such emergency situations into account?

[Yablokov] I haven't asked the military, but I'm absolutely certain it knows about the problem, and as absolutely uncertain that it cares. Now it has other headaches: army crisis, and economic crisis in general: there isn't even enough fuel to take the ships out to sea for naval exercises... Other experts, however, confirm my fears that with time the reactor of the Komsomolets, now lying on the bottom of the Barents Sea may become, as a result of corrosion, a dozen of times stronger source of radioactive pollution than all the present radioactive dumps in the Kara Sea are. Today, as yet, they are relatively safe.

A Nuclear Waste Burial Ground

[Correspondent] If you agree that nuclear waste has actually been buried in the Kara Sea on several occasions then what about the assurances made to the IAEA in 1990 by the Soviet government which officially denied this practice? A New times correspondent learned this from Dr. Hans-Friedrich Meyer, an IAEA representative, in Vienna.

[Yablokov] Information about the "burials" appeared in our media, and no one denied it. Andrey Zolotkov, a

former People's Deputy of the USSR who had dealt with the problem, also reported the facts, and I have some Murmansk papers carrying confirmation of the reports from the local naval base. I don't think that the USSR Government ever made the assurances you've mentioned. That must have been a statement by some deputy minister—an ill-informed one. The Gosatomnadzor (Atomic Supervision Committee) of the USSR had no way of monitoring the activities of the Defence Ministry or the Navy. We have just remedied the situation and set up the Russian Atomic supervision Committee which the military is now accountable to. Recently, the Navy asked for the Committee's permission to bury liquid radioactive waste in the Kara Sea. The permission was not granted.

[Correspondent] All right, this practice has been banned. So what happens to this waste now?

[Yablokov] Look at how all civilized countries deal with the nuclear waste disposal problem: they build special storages, concentrate the waste, and so on...In any case, we shall no longer put up with violations of international law. In accordance with international regulations, nuclear waste can be buried at sea on condition that precise information is provided on what kind of waste is buried and where, and that the depth of burial should be no less than four thousand metres...Neither the Kara, nor the Barents Seas are that deep. And, besides, radioactive waste is dumped elsewhere, too...

Atomic Nuclear Plants Have Not Become Any Safer in the CIS

[Correspondent] Judging by the quickness with which the news of the March 24 Sosnovyy Bor atomic power plant accident reached the outside world, we have begun to reckon with public opinion at home and abroad. By the IAEA seven-degree scale, our experts estimated the accident as third-degree. How dangerous is this level, and why was it estimated before IAEA experts had arrived on the scene?

[Yablokov] According to the scale, third-degree is a "serious accident" which means that the probable discharge of radioactivity did not exceed the normal daily amount five-fold. Judging by everything, no marked rise in radioactivity level took place in the atomic power plant area. Now we have to keep a close eye on the situation and to monitor this level continuously.

As to the IAEA experts, one shouldn't expect them to be objective with regard to our atomic power plants. The IAEA report on the level of our atomic power plants' safety, which appeared a few months ago, was coached in terms so soothing, that no one paid it any attention. Now a Greenpeace analysis of that report's initial data has revealed that the safety level of the CIS' atomic power plants is one-hundredth the world's average. Therefore, it is necessary, right now, to stop all of our old reactors which are not up to the international nuclear safety standards.

Siberia Will Be Adding to Our Country's Radioactivity

[Correspondent] Aleksey Vladimirovich, let us now come back to the Kara Sea. What do you mean by saying that "waste is dumped elsewhere"?

[Yablokov] I am concerned, and very much so, about other sources of the Kara Sea's contamination, about the practice of dumping radioactive waste in bodies of water in Siberia. Before we come to know for certain where Krasnoyarsk-45 and Tomsk-7 dispose of their radioactive waste, we have every reason to believe that all this waste, amounting to millions upon millions of curies, has been dumped in the Arctic Ocean. These plants just as the well-known Chelyabinsk-65, produce elements in the nuclear-fuel cycle. In Tomsk, as far as I know, waste is pumped into special underground storages, and Krasnoyarsk waste probably goes to the Yenisej River. There are too many indirect indications of that. Last year, for example, I read in the newspapers that the level of radioactive contamination of water in the lower reaches of the Yenisej amounted to 3-5 curies per sq. kilometre, which equals the soil contamination level around the Chernobyl atomic power plant. I have heard from the Greens in Krasnoyarsk recently that a narrow strip of land (some 100 m) along the Yenisej River, has a contamination level of 40 curies per one sq. kilometre in places over the distance of 1,500 km below Krasnoyarsk. Throughout the length of the river, there is only one source of contamination—the plant in Krasnoyarsk which has been in operation since the fifties.... Only an expedition to the lower reaches of the Yenisej, to the Kara Sea, and analyses of bottom sediments, can confirm or dispel these terrible suspicions.

[Correspondent] We are still trying to fathom the ecological abyss we've found ourselves in. We are not in a position to rectify the situation?

[Yablokov] Radioactive contamination is the most dangerous kind of contamination today. President Yeltsin shares this view. As many as five decrees and resolutions on ways to combat radioactive contamination have been issued over the past four months—no other kind of contamination has ever been dealt with so vigorously. One of these documents rules that a list should be made of all the contaminated areas and all the potential sources of contamination so as to get the picture country-wide. The important thing is that Yeltsin has been to Chelyabinsk-65, seen Lake Karachay rendered lifeless by radiation, the River Techa, and made several trips to the Chernobyl zone. I am sure the President is well aware of the magnitude of the problem. The ecological situation is getting steadily worse. Radioactive contamination of the environment is a threat not so much to us as to the generations to come. Our grandchildren will damn us for it.

We Are in the Ozone Hole Again

[Yablokov continues] The biggest threat to us is posed by a steady dwindling of the ozone layer in the atmosphere over the European territory. This phenomenon is going

to give us a hard time. Over the past few years, until the mid-1991, the amount of ozone in middle latitudes of the Northern Hemisphere diminished by three percent which, at my estimate, increased the incidence of cancer by 12,000 cases a year in the European part of the country; in 1991, the ozone layer dwindled another 40 percent.

[Correspondent] Didn't ozone holes appear before? Weren't effective measures taken to "heal" them?

[Yablokov] Indeed, the Montreal Protocol was signed in accordance with which the production of ozone-destroying agents is to be stopped by 1997. We have signed this Protocol, too, but aren't doing anything to put its provisions into practice. The whole world is now changing over from chlorofluorocarbons, which destroy the ozone layer, to their substitutes. Although slightly more expensive, they are our only hope. The President assured us that a state programme would be worked out for reducing the discharge of ozone-destroying substances into the atmosphere. None of the programmes adopted in the Soviet Union before worked, but who cared?

[Correspondent] Aleksey Vladimirovich, that our North has become a dump and this is only half the trouble. The other half is the still "silent" nuclear test ground in Novaya Zemlya. Will this silence ever be broken again?

[Yablokov] The military insist that the tests in Novaya Zemlya be resumed. On February 27, the President signed a decree on restoring the test site there, preparing new tunnels and galleries for underground blasts, because the Semipalatinsk test site has been closed for good. If the Americans do not join the unilateral nuclear test moratorium we have proclaimed, the President will be compelled to call it off.

If nuclear tests are necessary and inevitable so far, a suggestion goes, why not carry them out in one place—Nevada, for instance? This will cost us a pretty penny but turn out to be cheaper all the same. The suggestion was put forward a year ago by Academician Vitaliy Golden-skiy, Chairman of the Soviet (as it was called then) Pugwash Committee. It is being kept mum about because the idea doesn't appeal to certain quarters here. The military-industrial complex has always skilfully conducted, and continues to conduct, a propaganda campaign for nuclear tests. We are not going to develop new types of nuclear weapons, it says, but we have to test the warheads already made lest they should detonate accidentally...Academician Sakharov said that there exist absolutely reliable physical methods, outside tests, of checking whether the warheads are in order.

I respect these people for what they have done, but one has to make a choice sooner or later...

[Correspondent] You have already made it, haven't you?

[Yablokov] I think so...In 1953, when I studied biology at Moscow University, all the male students who

majoried in natural sciences and made good academic progress, were transferred to the chemistry department which, as we found out, trained specialists in rocket propellants. Those were very special times, no one was supposed "to reason why," so I decided to take two courses—biology and chemistry—simultaneously. Some time later, I quit the chemistry department, nevertheless. Many stayed on...One of them has become a Lenin Prize winner, now he is President of the Chernobyl Union. He has made his choice later...

Options for Nuclear Warheads' Elimination Examined

PM2005135992 Moscow ROSSIYSKIYE VESTI
in Russian No 10 (56), 15 May 92 p 2

["Expert's Opinion" article by Major General, Retired, Vladimir Belous, senior scientific associate of the Center for Strategic Studies and RAU-Corporation expert: "The Nuclear Bomb's Funeral. The Elimination of Nuclear Warheads Appears as Complex as Their Development"]

[Text] Russia and the United States must decommission and eliminate thousands of warheads. According to data from the Stockholm International Peace Research Institute (SIPRI), the U.S. tactical nuclear forces number 7,147 weapons [boyezaryad], and the corresponding CIS forces number 11,305. In the event of their commitments being honored, the United States will be left with 1,800 aviation bombs in service, and Russia with 3,100. Thus Russia will have to destroy about 8,000 tactical warheads and the United States about 5,500. Taking into account the strategic munitions which have to be eliminated under the START Treaty, each side will have to dismantle more than 10,000 weapons.

In this process, the eliminators will have to tackle devices with an exceptionally high degree of potential danger, and this will require the use of specialized equipment, comprehensively tested technology, high standards of production, and strictest compliance with safety requirements. This will make it necessary to develop a special enterprise or a major branch of the plant where obsolete munitions are now being dismantled.

According to estimates by eminent U.S. nuclear physicist T. Taylor, the daily throughput of such a plant will not exceed six to eight warheads per 24 hours. The cost of constructing the plant and of transporting and dismantling nuclear warheads will amount to about \$2 billion.

According to estimates by U.S. experts, by the late eighties each side's warheads contained about 100 tonnes of plutonium and 500 tonnes of highly enriched uranium.

Technically speaking, the task of utilizing weapons-grade uranium (containing more than 90 percent uranium-235) is relatively simple to solve by diluting it with natural uranium down to a 3-5 percent concentration.

The resultant material provides fuel for nuclear power station [AES] reactors. The utilization of weapons-grade uranium for these purposes could ultimately yield a considerable economic effect, but initially it would require solid expenditure on the development of new production units. Russia's current stocks of uranium needed for AES reactors will make it possible to release onto the world market the uranium extracted from weapons—once it has been depleted, of course. But the market is dominated by the United States, which supplies about 50 percent of the total volume of uranium sold each year. The former USSR accounts for about 6-7 percent of the uranium market, even though its share of confirmed uranium reserves in the world accounts for 45 percent. The United States, together with two European consortiums, is trying to curb Russia's uranium sales potential. False reports on embezzlement and illegal export of fissile materials outside Russia, which periodically appear in the foreign press, are meant to sow mistrust and to prevent a consolidation of Russia's positions in the world market.

But the utilization of plutonium presents the most complex scientific and technical problem. One of the ways to utilize it is to mix it with natural uranium and subsequently produce fuel elements for AES reactors. But the development of industrial AES's operating on such fuel also presents certain difficulties due to the complexity of controlling such a reactor's operations.

At present neither the United States nor Russia has industrial reactors operating on plutonium. There are, however, research reactors and power plant reactors operating on plutonium fuel.

Other proposals have also been made regarding the future of weapons-grade plutonium. In particular, it is proposed to mix the plutonium with nuclear reactors' radioactive waste and to subsequently entomb it in special depositories. But this way of eliminating this expensive substance is inexpedient both economically and ecologically. It must be borne in mind that the period of plutonium's half-decay is 24,000 years, and consequently we will be leaving the solution of this problem to many generations of our offspring.

Another proposal envisages the destruction of munitions containing plutonium by using a nuclear charge explosion in a special cave dug at great depth. Under the effect of high temperature, this will produce a destruction of weapons, partial fission of fissile materials, and subsequent vitrification of the entire melted-down radioactive mass.

Proposals have even been made to fly the plutonium beyond the Solar System using powerful booster rockets.

At present, however, the most preferable method is to develop special facilities to store plutonium under strict international verification. At the same time, it is necessary to pool the efforts by scientists from the world's

leading countries to elaborate methods for its utilization and develop reliable models of industrial reactors using plutonium as fuel.

Ecologically Safe Conversion of Udmurt CW Facility Pondered

92WN0486B Moscow NEZAVISIMAYA GAZETA in Russian 24 Apr 72 p 6

[Exclusive article for NEZAVISIMAYA GAZETA by TRUD journalist Elena Varshavskaya: "Poison Chemical Storage Site Can Become a Real Treasure: Town in Udmurt Worth Billions of Rubles"]

[Text] When "Greens" activist Leonid Zakharov goes outside his house and a bad smell, sometimes like rotten eggs, sometimes like garbage, hits him in the nose, he knows that the wind is blowing "from there."

And no matter how you try to persuade him otherwise, or anyone of the fifteen thousand residents who are holding their noses in Kambarka, they will stubbornly stand their ground. It is not fertilizers from the nearby fields that has reached them, not the local machine building plant that has despoiled the atmosphere, no. Just as the nearby pine forest is certainly not withering away because of the railroad construction people have destroyed something in the soil there, but for an entirely different reason.

The largest chemical weapons storage site in the territory of Russia is located in Kambarka.

It was to here, to a far corner of the Udmurt ASSR, that they transported toxic chemical agents at the very beginning of the war. And since that time, terrible death, poured out into dozens of cisterns, has been stored in specially constructed buildings there.

In the middle of the 1980s, the storage area gave a reminder of its presence in a sudden and threatening way. Strange smells began to spread from its direction throughout the district. And all of Kambarka began to buzz: the military are incinerating poisonous substances. From this time on, the residents of the city have once and forever lost their calm. The chief physician of the republic's SES [Sanitation and Epidemiology Service], N. Zabrodin, provides the following information:

"An attempt to utilize yperite and lewisite (generally toxic chemical agents) was undertaken about six or seven years ago. An installation was built but work was halted for various reasons (a lack of necessary technology for utilization, possible consequences in case of accident, equipment faults, low productivity, etc.)."

What is meant by an "attempt" remains unclear and this therefore creates a possibility for various interpretations.

The situation with regard to the health of the residents of Kambarka has deteriorated. The city has assumed first place within the republic in terms of number of oncological diseases. It is true that it is difficult to know where

this came from. Indeed, it is not just being the neighbor of military storage sites that makes Kambarka far from the most idyllic corner of the world in which to live. There is not enough drinking water here, and what there is far from being of the best quality. In the pond—which is the local object of note—it generally fails to meet sanitary norms. Kambarka has no sewer system, and what this is fraught with does not need to be explained.

However, the passions that have begun to blaze specifically around the chemical weapons are not by accident. Not the smallest role in kindling them has been played by the military themselves. Decisively disowning any participation of any kind of ecological destruction, they have refused point-blank to raise the curtain of secrecy covering their activities. People have become lost in conjecture and, correspondingly, have been coming up with versions, each more horrible than the other, of what is being done “there.”

The population of Kambarka greeted the signing of a Soviet-American agreement on chemical disarmament as an event in their own lives. They began to wait for when they would take the poison away from next door.

And now—an unexpected turn-around!

It has turned out that lewisite is not only a toxic agent with a horrible effect, but also ... a valuable raw material. Pure arsenic can be obtained from it. The essence of the matter is that Kambarka has become the largest “deposit” of arsenic on Russian territory. About seven thousand tons of lewisite are stored here, from which, by means of processing, it is possible to obtain particularly pure arsenic. Moreover, the appropriate technology already exists and calculations are also available. Here, for example, is one of them: “Already by 1994, it is realistic to organize industrial production of considerable quantities of especially pure arsenic trichlorides (up to 100 tons a year), metallic arsenic (30 tons a year) and epitaxial structures of gallium (50,000 square centimeters per year) with parameters that satisfy the requirements of a broad market, to build a self-actuated solar energy module [upravlyaemaya module solnechnoy energitiki] with a capacity of 200 megawatts, and also the production of ultra-high frequency equipment... The economic effect, even at this stage, is anticipated to be not less than 100 million rubles.”

And there is more in the future. During the period from 1995 to 2000, it is planned to organize industrial production of a new generation of high-purity, arsenic-content compounds and products based on them. The economic effect will be 250 million rubles per year. The destruction of chemical weapons will become self-supporting and, this means, will not require the expenditure of funds from the state budget to finance a program of eliminating toxic substances. The republic will receive its part of the profits, without applying any kind of extra efforts.

“From an ecological point of view, reprocessing of the lewisite is preferable to its destruction,” says V. Vasin, a

department head in the Russian Ministry of Ecology. “To transform chemically, to detoxify, is always less hazardous than to blow up or burn. In the latter cases, the burden placed on nature is tripled. The direct elimination of toxic substances is first. Then the extraction from deposits of arsenic mineral products. And finally, third, enrichment of the arsenic and obtaining the final product. Reprocessing of lewisite can kill three birds with one stone.”

All this looks more than impressive, especially if one considers that the calculations were made last year, before the rise in prices. And knowing that a kilogram of metallic arsenic costs four and a half dollars on the world market, it is possible to estimate that the earnings from reprocessing lewisite will simply be in the billions.

In the Udmurt Supreme Soviet several proposals of various alternative technologies for the processing of lewisite, proposed by several firms, are being examined. The one that gives maximum benefits to the rayon and turns out to be least dangerous ecologically will be accepted.

But expediency is one matter—and a completely different one is our reality, to which we do not always yield sensibly.

“Let them take off for the moon; we’re not going to let them do their processing here!”—this is what many in Kambarka are now saying. The situation in the town is heating up, becoming explosive.

“The idea itself of processing lewisite looks very attractive,” says the chairman of the Kambarka rayon executive committee, V. Konyashin. “Especially if the rayon, as a form of compensation for the presence of military personnel within its territory, will participate in the profits from this production. But we are afraid that they will again go around us. That they will do all the work on the sly, and later, without prior permission, will begin waste recovery operations [utilizatsiya].

And if someone tries to do this, to use power methods, the consequences will be lamentable. The scenario, according to which events will begin to develop, is known in advance: people driven to unhealthy suspiciousness, who have lost their trust, will rise against the carrying out of any operations. And then, no kind of expertise, no kind of agreements will be effective. A useful, promising effort will turn out to have been destroyed.

Russia Faces ‘Extremely Unfavorable’ Radiation Situation

92WN0534A Moscow ZELENYI MIR in Russian
No 13-14, Apr 92 [signed to press 9 Apr 92] p 5

[Interview with Professor Abram Isakovich Ioyrish, head of the sector on problems of the use of atomic energy of the Institute of State and the Law of the Russian

Academy of Sciences, by Natalya Filimonova, time, place, and occasion not specified]

[Text] Work is in full swing at the subcommittee for radiation safety on the draft law of the Russian Federation entitled, "State Policy in the Field of Handling Radioactive Waste." The expert group includes chemists, physicists, attorneys, medical specialists, and ecologists, in other words specialists in all aspects of this complex and intricate problem.

The questions of ZELENYY MIR's parliamentary correspondent Natalya Filimonova are answered by Professor Abram Isakovich Ioyrish, head of the sector on problems of the use of atomic energy of the Institute of State and the Law of the Russian Academy of Sciences.

[Filimonova] Will the law which you are now discussing create a legal guarantee of our radiation safety?

[Ioyrish] No. Intelligent handling of radioactive waste is only a part of the problem. We must also adopt a more general law on the use of atomic energy. In general it would be sensible to begin with that, but as it happened this draft was ready first. I hope that the Russian laws will not suffer the fate of the Union Law on the Use of Atomic Energy and Nuclear Safety, which through the fault of the USSR Council of Ministers was discussed for 5 years but simply never adopted.

[Filimonova] In what stage is work on the Law on Radioactive Waste right now?

[Ioyrish] The structure of the sections has been determined, and articles are being outlined. The version which we were given to examine, according to the general opinion, cannot be considered successful. It will be greatly reworked, though we all understand that we cannot drag this matter out. Reality is pushing us.

[Filimonova] What is the radiation-ecological situation in Russia today?

[Ioyrish] Extremely unfavorable. And this is not just because of the radiation disasters (Kyshtym and Chernobyl) but also the incorrect state policy which led to the accumulation of large volumes of radioactive waste. The methods and conditions of their storage are such that they have become sources of gradual contamination of the environment and are creating a potential danger that new radiation disasters will occur.

Radioactive waste can be divided into two categories: waste which forms during the use of atomic energy for peaceful purposes (in the operation of AES's [nuclear electric power plant] and transport reactors, waste from scientific research and medical institutions, and so on), and waste that we have as a result of obtaining plutonium for military purposes and also from regeneration of nuclear fuel. A significant share of this waste belongs in the highly active class.

The complexities of solving the problems of localizing and burying the radioactive waste of these two categories

are not comparable. While the problem of the first type of waste is being solved successfully, we are having fundamental difficulties safely localizing waste of the second type. Experts acknowledge that we are behind the developed countries in this. We do not even have a decent testing ground.

[Filimonova] But certainly some useful experience has been accumulated?

[Ioyrish] Scientific and practical work on questions of processing and handling radioactive waste has been done in Russia in recent decades. The level of these developments in general matches the world level, but a number of areas need acceleration and development because of the necessity of major expenditures.

We are most behind in the field of final isolation of radioactive waste, especially burying the most dangerous, highly active waste. This is because first we must carry out large-scale scientific studies and build large underground structures.

Russian specialists have developed original plans that make it possible to find a comprehensive solution to this problem. A system of measures has been determined for dependable isolation of radioactive waste of different levels and origins. Permissible levels of nuclide radiation impact on the environment have been calculated. Technologies that have been developed for processing waste can ensure its isolation in terms of all essential conditions and requirements.

[Filimonova] It is apparent that atomic energy is going to continue to develop. In any case, its opponents do not have much chance of success in this dispute at the present time. This means that we have to design a system which can shield us from the lethal action of radiation waste.

[Ioyrish] The state program to build such a system was developed long ago. Here are its main points:

- creation of a data bank on the quantity, characteristics, and sources of the formation and methods of handling radioactive waste and an effective system of state regulation of the handling of radioactive waste;

- organization of comprehensive radiation-chemical monitoring at the points of formation, processing, storage, and burial of radioactive waste and prediction of the behavior of biologically significant components in environmental sites;

- development of normative legal documents with due regard for the expertise of currently existing documents;

- creation, on the basis of a program of radioecological and socioeconomic research, of a register of regions of the country that meet the requirements made for places to locate long-term storage facilities (burial vaults) for radioactive waste;

—analysis and refinement of existing methods of handling waste at all sites;

—conversion of all liquid and solid radioactive waste into forms that ensure safety in storage, shipping, and burial;

—performance of comprehensive scientific-research and planning-design work when nuclear fuel cycle facilities and nuclear research and transport devices are taken out of service;

—performance of the program of work to handle the waste formed as a result of the accident at the Chernobyl AES'

—raising the level of ecological sophistication of personnel and the population in the field of solutions to the problem of radioactive waste;

—creation of a centralized storage facility for long-term storage of heat-emitting elements that cannot be processed;

—preservation of bodies of water, basins, and proving grounds built for defense measures and rehabilitation of contaminated territories;

—performance of a program of pure research and experimental work on the key scientific problems, aimed at refining existing methods of handling waste and developing alternative methods.

The complexity and scale of all these measures requires the cooperation of many departments.

This program has now been submitted to the Russian Ministry of Ecology and, I hope, will be ratified soon.

Chernobyl-Related Contamination in Russia's Oblasts Detailed

92UN1276A Moscow ARGUMENTY I FAKTY
in Russian No 16-17, May 92 p 7

[Unattributed report: "Echo of a Tragedy"]

[Text] *How many oblasts in Russia were affected by Chernobyl? (question from O. Kalarova, Kursk Oblast)*

According to what we were told by the Russian State Committee for Hydrometeorology, as of March 1992 soil contamination by radionuclides with an average contamination density for cesium-137 of over 1.0 curie per square kilometer had been observed in 15 Russian administrative territories: Bryansk Oblast (over 34 percent of the oblast's surface area), Kaluga Oblast (17 percent), Belgorod Oblast (8 percent), Voronezh Oblast (1.5 percent), Kursk Oblast (4.4 percent), Leningrad Oblast (1 percent), Lipetsk Oblast (approximately 8 percent), Orel Oblast (40 percent), Penza Oblast (3 percent), Ryazan Oblast (15 percent), Smolensk Oblast (0.5 percent), Tambov Oblast (1.7 percent), Tula Oblast (47 percent), Ulyanovsk Oblast (0.6 percent) and Mordovia (2 percent).

Those areas are covered by the Russian Federation "Law on Social Protection for Citizens Subjected to Radiation as a Result of the Chernobyl Nuclear Power Plant Disaster."

In all other areas studied the average degree of soil contamination by cesium-137 varied widely, but in no case exceeded 1.0 curie per square kilometer.

In Arkhangelsk, Vladimir, Volgograd, Vologda, Ivanovo, Kirov, Samara, Moscow, Murmansk, Orenburg, Perm, Pskov and Yaroslavl oblasts, in Stavropol Kray, and in the republics of Bashkortostan, Mariy El and Komi the degree of contamination was under 0.1 curie per square kilometer.

Levels of less than 0.2 curie per square kilometer were measured in Astrakhan, Kaliningrad, Kostroma and Rostov oblasts, Chuvashia and Kalmykia. Levels of less than 0.3 curie per square kilometer were found in Karelia. Levels in Saratov Oblast and Udmurtia were under 0.4 curie per square kilometer. In Tver, Novgorod and Nizhnegorod oblasts levels were between 0.5 and 0.6 curie per square kilometer.

Traces of Chernobyl have also been found beyond the Urals, so therefore more detailed study will be required in that area as well.

Conference Views Failure of Chernobyl Program

LD2005174792 Moscow ITAR-TASS in English
1654 GMT 20 May 92

[By ITAR-TASS correspondent Yuriy Lodkin]

[Text] Bryansk, May 20 (TASS)—This year's programme of eliminating the consequences of the Chernobyl catastrophe on the Russian territory is doomed to failure, according to the majority of participants of a conference which opened in Bryansk today. Among those present at the conference are heads of ministries and departments of the Russian Federation, and representatives of authorities from twelve regions of Russia, which suffered from the accident at the Chernobyl nuclear power-station.

Speaking on the course of the implementation of "the Chernobyl programme of urgent measures," Ivan Panfilov, the first deputy chairman of the state committee on the elimination of the consequences of the chernobyl catastrophe, stated that the plans for the resettlement of the population to territories clear of radiation are being carried out very unsatisfactorily. For instance, in the first four months of this year, a plan for building resettlement objects in the Bryansk region is implemented only by 55 percent. This means that hundreds of families who have been living in the "zone of the strict radiation control" for the seventh year, will have to postpone their hopes to move to the pure zone in the near future.

Participants of the conference consider the main reason for the programme's failure extremely insufficient financing of the "Chernobyl objects" by the Russian Ministry of Finance.

'Mayak' Proposed as International Nuclear Waste Facility

92WN0522B Moscow *RABOCHAYA TRIBUNA*
in Russian 30 Apr 92 p 3

[Interview with Aleksandr Suslov, chief engineer of Mayak Production Association, by Mikhail Popov: "A Convertible 'Cesspit'"; place and date not given]

[Text] Chelyabinsk Oblast is called a radioactive dump. But we can in fact derive benefit from its unpleasant situation. A considerable amount.

[Popov] Chelyabinsk Oblast can earn tens of millions of dollars a year by remaining a "radioactive dump."

[Suslov] We are proposing a unique method of neutralizing the waste of a nuclear production facility—so-called vitrification, [says the chief engineer of the Mayak Production Association, Aleksandr Suslov]. Unique ovens developed by the Scientific Research Institute of Chemical Machine Building in Yekaterinburg have been installed in our plant. We will use them to transform solutions containing radioactive isotopes of cesium, strontium, plutonium, and other elements into glass which we will force into sealed tanks shaped like large milk cans. Additionally we will isolate these cans in isotope cans, three in each one, and in a storage facility for the long term. Almost 3,000 cubic meters of waste which contains more than 51 million curie of beta-active radionuclides and 381,000 curie of alpha-active radionuclides have already been processed at the enterprise. Chernobyl discharged roughly the same amount at one time. Two more ovens have now begun to be built. They are to "digest" 20,000 cubic meters of waste.

[Popov] So then we are condemning ourselves to the role of hostage to the nuclear genie who is sealed off for the time being? After all, the more "cans" there are, the more danger there is.

[Suslov] Vitrified waste can be stored forever without risk if only some global cataclysm does not occur. But permanent storage will not be needed. For even in a sealed form radioisotopes decay. If some way is not devised to use them profitably in industry, then in 300 years they will prove to be completely harmless as the result of complete decay.

[Popov] Here, let us be frank, there are few people who will believe you, since we are all afraid of radioactivity. And especially the Chelyabinsk residents. The pioneer AES [nuclear electric power station] in the Southern Urals did so much harm that people started to call the oblast a "nuclear cesspit." The question reasonably arises: why must a storage facility be built right here?

[Suslov] Of course Mayak could be closed altogether, as the "greens" demand. But what will that do?

First, a similar plant and a storage facility for warheads removed from weapons and for spent nuclear fuel will all the same have to be built in the country. That means more enormous expenditures when we already have a smooth-running production facility.

And, secondly, where will the wastes accumulated from Mayak's previous military programs go? Lake Karachay and the nearby reservoirs alone contain up to 60 million curie of radioactivity. We certainly cannot leave them in this position, everyone understands that. But transporting liquid radionuclides to a new burial site means subjecting the entire country to a fatal risk. Isn't it safer to dispose of them in the same place where they are?

As for the "nuclear cesspit," some people imagine that the waste here is scattered about in heaps and we scoop it up with a shovel. It is difficult, oh so difficult to change the suspicious attitude toward us after 40 years of secrecy. But many "greens" who have visited Mayak even so have reached the opinion that our technology is safe. They agreed that vitrified waste in milk cans is undoubtedly safer than contaminated reservoirs under the open sky.

[Popov] But all the same it is one thing to correct your own mistakes and process the poison that Mayak itself produced. But it is something else to bring it here from every corner of the former Union and from abroad.

[Suslov] Practices are such that the producer of nuclear fuel assumes responsibility for neutralizing its residue and waste. Operating in Russia are two atomic power plants whose fuel we are processing—the Novo-Voronezh and Kolskiy AES's. It is possible that the energy problem will force us to start up the plant in Armenia again. And the Rovno AES remains in Ukraine too. But here intergovernmental decisions are already needed to continue contacts.

There are atomic power plants in East European countries too—Hungary, Bulgaria, Czechoslovakia, Germany, and Finland. We used to process their fuel free of charge. Now we take hard currency to do it. Germany, in particular, offers a good price. This approach can mean 40-45 million dollars a year for Chelyabinsk Oblast. A considerable amount of money. It is needed to decontaminate and rehabilitate territory which is already contaminated and cure people who have suffered. As yet we have no other way to earn that money.

Russia, Norway To Look for Radioactive Waste in Barents Sea

LD0805103292 Moscow *ITAR-TASS World Service*
in Russian 1352 GMT 6 May 92

[By ITAR-TASS correspondent Valeriy Loskutov]

[Text] Oslo, 6 May (ITAR-TASS)—Norway and Russia will begin to implement practical measures to search for radioactive waste submerged in the Barents and Kara Seas. This effort by both countries is contained in a protocol presented in Oslo today on completion of a working meeting between Norwegian and Russian experts. According to the agreement, this summer a joint Norwegian-Russian expedition will conduct investigations in 14 maritime areas with the aim of determining where radioactive waste is buried and the degree of the ecological danger.

In addition it is planned to determine the general picture of pollution in the area, discover other infection sources, and in particular investigate the ways of possible radioactive pollution of the northern sea waters via the Gulf Stream and the waters of the Siberian rivers Ob and Yenisey.

Aleksey Poryadin, the head of the Russian delegation, told a news conference that, according to the figures available, the radioactive waste submerged in the seas presents no danger for the populations of Norwegian and Russian coastal areas. As regards raising the nuclear submarine "Komsomolets," which sank in the Norwegian Sea three years ago, this issue was not officially on the agenda, but was nevertheless broadly discussed. The general opinion was expressed by Berre Petersen, the head of the Norwegian delegation and state secretary at the Ministry for the Protection of the Environment, who noted that it is best to leave the submarine where it is.

A regular meeting of a group of Norwegian and Russian experts will take place in May-June in Murmansk.

Program Developed for Nuclear Waste Disposal in Space

PM1005183392 Moscow Teleradiokompaniya
Ostankino Television First Program Network
in Russian 2000 GMT 7 May 92

[From the "Novosti" newscast: Video report by Ye. Sedova]

[Text] [Sedova over video of an object floating in space] In an effort to rid the Earth of dangerous nuclear waste, our defense enterprise specialists have elaborated a program for the disposal of radioactive waste in space. The program is called "Shans" ["Chance"]. Our scientists have submitted several options. For example, nuclear power station waste could be dispatched on a powerful craft beyond the Solar System, or drowned in the gaseous atmosphere of Jupiter or Saturn, or sent directly to the Sun, or burned up with a laser beam somewhere far away in space.

The authors of the "Chance" program are intending to submit it to the United Nations. Let the world community decide. In any event, the authors say, our country could not implement the program single-handed. To dispatch just one ton of waste into space would cost up to

\$250 million. Special, new types of carrier rockets are also needed, designed specifically for this purpose.

And so all that needs to be done is to allocate some funds. If this happens, the first experiments under the "Chance" program could take place during the current year. [video shows rocket launches interspersed with computer graphics of objects floating in space and photographs of Jupiter, Saturn, and the Earth]

Radiation Safety Union Formed in Vladivostok

LD1105192892 Moscow POSTFACTUM in English
1558 GMT 11 May 92

[From the "Politics" section]

[Text] Vladivostok—The Maritime Union of Radiation Safety, called Chernobyl-Plumbum, began work in Vladivostok on May 11. Founders of the union conceived Chernobyl-Plumbum as an organization to eliminate social and ecological consequences of accidents at nuclear power stations and submarines, as well as to give assistance to victims of such accidents in the Maritime region. Founders estimate the number of victims in Primorye to be 1,000 people and in the Far East 2,000. The Radiation Safety Union was registered in Vladivostok on April 26 this year. Founders are several public organisations of the city and private persons.

Russian Mutagenic Society Formed

92WN0522A Moscow DELOVOY MIR in Russian
3 Apr 92 p 11

[Article by Yelena Pavlenova: "Will the Mine Explode?"]

[Text] "The nation faces a real threat of degradation," so believe scientists from the Russian Mutagenic Society which was created recently and is headed by Academician N. Dubinin.

Of course, if the topic is ruin, diseases, and degradation, that means us. Even when the threat is concealed in an environment which is common to all the planet's inhabitants, here too we come out one-on-one with the enemies of the human race—but not to fight, rather to say: "Welcome." We come out openly, not because we are bold but because we do not have enough means of defense.

Mutagens are not only and not so much our enemies; they are the enemies of all the generations which will come after us. They are substances which act destructively on the genes and change heredity. A delayed action mine swallowed by humankind.

We now know for certain that 1 out of 10 chemical substances discharged into the biosphere by man poses a genetic danger. But that means merely those which we have managed to verify. And if it is taken into account that there are hundreds of thousands of such substances

and only a very small part of them have been studied, scientists' warning will not seem overly tragic.

But all the same we are speaking not of humankind but of a nation. Because humankind has recognized the face of the enemy and learned how to defend itself.

Given the present unrestrainedly rising prices, it is offensive to think of those poisons which will end up in our diet. And stories like the Christmas-tide story which happened with the English beef which our friends from Misty Albion sent for our New Year's table and which did not pass the strict Moscow sanitary control cause real rage. But after all, almost one-third of the domestic meat lying modestly on counters contains mutagenic and carcinogenic admixtures—pesticides and herbicides.

The situation for us, I would say, is a traditional one. Were we not the ones in the years of the Vietnam War to protest loudly against the atrocities of the Americans who poisoned Vietnam? But at the same time we ourselves were furiously conducting peaceful chemicalization of agriculture, lavishly fertilizing our boundless cotton fields with those same genetic poisons, and without any military actions whatsoever poisoning hundreds of thousands of people who were not guilty of anything. And it is not for us to compare the losses for our descendants from these deliberate actions to the misfortunes of a long drawn-out war.

The consequences of the action of mutagens are terrible and unpredictable. The chairman of the governing board of ROMO [Russian Mutagenic Society], Doctor of Biological Sciences Valentin Tarasov, compared their impact to the explosion of an atomic bomb—it is not simply a one-time tragedy but a drama that continues to infinity.

Today in Central Asia biologists, geneticists, and medical experts are studying the consequences of the first act of this drama. They link the sharp rise in congenital deformities, spontaneous abortions, and the pathologies of pregnancies and births, whose curve rose in precisely those years, to the arrival of chemicals in the fields of these republics in the late 1950s. We hid these facts from ourselves not only because we were the only country in the world which classified data on illnesses but also because of extreme poverty. After all, after we realized how harmful fertilizers and the waste from their production were, we should have renounced the increased harvest—the joyous reports and optimistic summaries. In short, the luxury of being healthy is accessible only to the rich.

The same picture exists in pharmacology. Because of that same poverty we compensate for the lack of analgesics with pyramidon (amidopyrine) and its compounds, which according to reason should be banned. These anesthetic substances have a side effect not mentioned in the instructions: a mutagenic, carcinogenic, and teratogenic (congenital-deformity causing) effect. But do not rush to throw them out of your home medicine cabinet, if you still have such a thing. Otherwise you risk having

nothing at all. Even such innocent medicines as phenacetin, paracetamol, and furacin are also mutagens. Many medicines ended up in our homes simply by deception—drugs which the Ministry of Health promised to include in the list of medicines used for vital indicators were freely sold, and they were even bought for children.

Of course, the Ministry of Health does not deceive us because the people who sit in its offices are cruel and pathological liars. The reason is the very same—poverty. The same thing can be used to account for the construction of a plant to produce banned metrinidazol (trichopol), which many people do not understand.

We are borrowing often and deeply from future generations. We are squandering mineral wealth, destroying nature, and discharging substances into the atmosphere which may ultimately squeeze out all living things. Even in our country capital punishment has been banned numerous times as a barbarous and senseless measure. But today we ourselves are sentencing people who we know are innocent—our descendants—to the supreme punishment.

Recently a sanitary-epidemic control office was set up under the office of the president of Russia. But there are no specialists on mutagenic control. The specialists seem to exist on their own, and now they are united in ROMO. Although there is not yet a state system of mutagenic control, scientists who are members of the society through their work are conducting expert studies of genetic danger at those enterprises whose managers have appealed to them for help. But for now these measures are more like the well-known call: "Those who are drowning must save themselves." But strange as it may seem, for them it is not always beneficial and almost always impossible.

Candidate of Biological Sciences Aleksandr Shapiro told how his laboratory conducted an appraisal of the genetic situation at one of the Baltic pharmacological enterprises. And what was the result?

The plant faced a choice: to leave the workers without jobs or by preserving harmful production to preserve the danger of genetic deviations in their descendants. Unemployment now for us or some health problems tomorrow for some other people? The director's reflections were concluded with a mournful sigh: "But what can I do? The technology must be changed immediately, but that means millions of dollars. Where can we get them?" And then he proposed to the members of the expert commission that they watch a videofilm taken at a Western pharmacological factory where those latest technologies which were desired but inaccessible were being used.

And then, why does a Western entrepreneur invest enormous amounts of money in genetic protection and preserving ecology? Not only because he is richer and more far-sighted. It is profitable for him. Throughout the world ecological protection is reinforced legislatively. It turns out that it is easier to ensure ecological safety

(including mutagenic safety) at your production facility than to pay enormous fines to the state.

Valentin Tarasov is convinced that one of the most important tasks of society is to help the organs of state power and government formulate laws to normalize and preserve the ecological environment. Ecological legislation must be changed so that it is profitable for enterprises to invest money in protective measures.

Until the law takes the side of our descendants, discussions of losses for taking care of malformed children will have moral but by no means economic grounds (10 years ago one such child cost the state 2,000 rubles a year, and now with the inflation adjustment it is substantially more expensive; 5 percent of newborns today have congenital deformities).

There is a unified society to study mutagens in Europe. Besides us only Albania is not a member. The continent's scientists have joined together in studying this problem because the environment is not subject to being divided by state borders. It is a common problem to us all. As usual we are the last to guess that. Won't it be too late? Won't the mine blow up?

Tatarstan Group Urges All-Russia Referendum on Nuclear Plants

92WN0531C Moscow ROSSIYSKIYE VESTI
in Russian No 7, 6 May 92 p 1

[Untitled report under the rubric: "Ecology"]

[Text] The antinuclear movement of Tatarstan is gathering signatures on an appeal to conduct an all-Russian referendum on closing down all atomic power plants by stages.

As Albert Garapov, chairman of the Tatarstan antinuclear movement, stated, despite the halt on construction of the Tatar AES [electric nuclear power station] inhabitants of the republic are not free of the threat of a nuclear disaster because the Balakhov and Kalinin AES's are located near Tatarstan and the Mayak Association of Chelyabinsk Oblast is also a source of dangerous contamination.

At the same time, in the opinion on Aleksey Kolesnik, chairman of the commission on ecology of the Tatarstan Supreme Soviet, for now the economy could not survive without atomic power, so it is not possible to shut down all AES's today. Kolesnik also believes that it would be better for the "greens" movement to aim at closing AES's with outdated equipment and safety systems.

Krasnoyarsk Underground Nuclear Power Station To Shut Down

PM0705143092 Moscow ROSSIYSKAYA GAZETA
in Russian 6 May 92 First Edition p 3

[Correspondent Boris Spiridonov report: "Underground Chamber Open"]

[Text] Krasnoyarsk—Secret facilities have one thing in common with Russian poets. They both become famous, as a rule, after their death. So it will come as no surprise if the final shutdown of the first of three reactors of the underground AES [nuclear power station] of the Krasnoyarsk-26 mining and chemical combine, scheduled for July of next year, becomes a popular festival under the green flag of ecology. For obvious reasons, the public at large was not informed of its birth back in 1957, and its startup was marked only in a narrow circle of reticent people resembling the "greens" only in the color of their uniform.

Today, from a distance of three decades—a significant length of time in the youthful history of nuclear power—the easiest thing of all is to accuse these people of a negligent attitude toward environmental conservation: It is now no secret that the first two reactors of the mining and chemicals combine are direct-flow—that is, the water, after cooling the "belly of the infernal machine," with no special purification, is poured into the Yenisey. For more than 30 years now.

All the same the Krasnoyarsk AES is one of the safest not only in the country, but in the world, in the event of any serious cataclysms. If the word "safe" can be applied to nuclear power stations at all. Scientists have calculated that, were there to be an accident here—an explosion or a fire, then only one-thousandth of the radioactive "dirt" would get out. And that is understandable, because the reactors of the mining and chemical combine are hidden deep underground: The AES is 200-300 meters from the surface.

Undoubtedly the very last concern of the creators of this top secret facility was the safety of the inhabitants of the nearby villages of Krasnoyarsk. They were concerned to ensure the safety of the plutonium production facility from possible enemy air raids and nuclear missile strikes. That was why the plant was hidden deep underground. The best cure for radiation phobia is an energy crisis. Nuclear specialists say that in Armenia and the Baltic, having tasted the scant "delights" of life without electricity or heat, even the most zealous advocates of the creation of nuclear-free zones in those republics have moderated their activity. The Chernobyl syndrome is understandable, but the world trend in economic development suggests that nuclear power is developing and will develop in all the superpowers. Clearly this "fate" is inescapable for us too, although we have always been accustomed to looking for some path of our own that has hitherto been unknown to the world. That being so, then the experience of one of the country's first AES's is apposite. Because nowhere in the world, either before or since, have such facilities been built underground. Building underground enterprises is a costly pursuit. In the "devyatka" [not further identified] the land was hollowed out by prisoners and soldiers. So it was not difficult for the construction workers to keep within the "budget."

Dr. Steven W. Popper from the United States, a participant in an international seminar at Krasnoyarsk-26, observed:

"The reasons why direct foreign capital investments are to the advantage of the Western business world are obvious. But in addition they will provide an avenue of activity and scope for applying their own efforts for those who will be the owners and leaders of enterprises in the former Soviet defense sector of industry. The transition from the former positions of exclusivity and criminality to a new position will be less painful for such enterprises."

Moscow's Environmental Ills Recounted

92WN0538A Moscow ROSSIYSKAYA GAZETA
in Russian 16 May 92 p 5

[Article by D. Volkov: "Can One Be Healthy in the Capital?"]

[Text] Some 130 years ago (in 1860), there were only 360,000 people living in Moscow. Moscow residents hunted rabbits in Sokolniki, and in the place where the Communal Square today stands there were large gardens which supplied the city residents with early greens and vegetables. These gardens, we might add, existed up until the 50's of our century.

In the years which have passed since that time, three mighty blows of accelerated urbanization have crashed down upon Moscow. After the repeal of serfdom in 1881, the city's population doubled in one year, and by 1874 it had reached almost a million people.

Today's huge urbanized megalopolis, the country of Muscovy with a permanent population of 10 million people, is characterized by practically impossible conditions for healthy and useful public life. We know that the volume of harmful emissions into the city's atmosphere comprises 1.3 million tonnes per year. That is approximately 100 kilograms per person! Seventy percent of these emissions are produced by automobiles, which shoot out their poison (there are over 100 types of poisonous substances in automobile exhaust gases) straight into our lungs. The saddest thing is that these tonnes of poison do not disappear anywhere, but settle right here, in the city. They impregnate the ground, the asphalt, the walls of houses, and the stunted Moscow trees, giving rise to secondary, "long-playing" toxic substances. Even the water reservoirs near Moscow have now been poisoned.

We may say without exaggeration that we, dear fellow countrymen, are living in a gas chamber for condemned prisoners! Every year, the Filatov Children's Hospital accepts from the maternity homes more than 10 mutant children born to completely healthy parents. The number of pulmonary diseases among Moscow children has increased by an order (i.e., by 10 times) over the last 10 years, and 90 percent of the school-age children have been neurotized.

Of course, we may invest billions (if only we had them) to protect against this poison. But even if all production and all transport in Moscow become ecologically pure, we would have nowhere to go to get away from the catastrophic dust pollution of the atmosphere, which in the fall-spring period everywhere exceeds the PDK [marginally allowable concentration] by 3-4 times. The huge expanses of Moscow, practically devoid of "green lungs," make it impossible for the winds to purify the atmosphere.

For a principle solution to the question, the Moscow Soviet would do a great deed if it prohibited the mayorality from engaging in new construction in Moscow and in the oblast.

Considering the specific harmful effect of automobile transport, it is logical and humane to sharply increase the tax on automobiles "registered" in Moscow, and also to introduce fees to be collected for cars from other cities entering and staying in Moscow. There are approximately 2 million local automobiles and 300,000 autos from other cities "registered" in the city. Simple arithmetic allows us to estimate the income from the proposed local tax.

The funds collected should be directed in their entirety toward compensation for loss of health by Moscow residents. This money must go toward financing ecological measures in the city. The Moscow Bank, which is subordinate to the Moscow Soviet, must form an ecological protection fund for the city, and pay out this compensation (at the wishes of Moscow residents) in bank stock with acceptable dividends.

There is also an alarming and obvious fact which has up until now been kept silent: For some time now, the city has had no natural population growth.

Research Confirms Lipetsk Among Russia's Most Polluted Cities

LD0805102592 Moscow ITAR-TASS in English
0729 GMT 7 May 92

[By ITAR-TASS correspondent Nikolay Zagnoiko]

[Text] Lipetsk, the centre of the Russian metallurgical industry, is one of the ten most polluted cities of the Russian Federation. The results of the recent research, with which PANORAMA, the newspaper of the Lipetsk Regional Administration, acquainted its readers, confirm this conclusion. Specialists point out that the maximum permitted levels for carbon monoxide are exceeded by 2.6 times, ammonia—2.3 times, phenol—six times, hydrogen sulphide—2.5 times and nitrogen dioxide—from two to ten times.

The Novolipetsk Metallurgical Works alone spews 40 elements from the Mendeleyev table, of which 35 are toxic, into the atmosphere and water bodies.

The unfavourable sanitary situation in Lipetsk continues to affect the quality of drinking water. The decisions by the Regional Council, which were adopted in December 1990, remained unfulfilled and the outlays for ecology in 1991 have even shrunk over the previous year.

Ufa Drinking Water Contaminated by Dioxins

Bashkortostan Appeals to Russia

92WN0542A Moscow NEZAVISIMAYA GAZETA
in Russian 14 May p 3

[Unattributed NEZAVISIMAYA GAZETA report: "Dioxin in Drinking Water: Republic Supreme Soviet Appeals to Russian Authorities To Declare Ufa an Environmental Emergency Zone at the Federal Level"]

[Text] "There already exists a critical ecological situation in the city as a result of contamination of drinking water with dioxins," states a resolution adopted on 12 May by the Bashkortostan Supreme Soviet Presidium. Studies conducted in April indicate that the concentration of toxic dioxin isomers in the drinking water supply exceeds established norms by factors of between two and 25. Studies of soil, water, snow and biological samples testing dioxin concentrations also confirm that Ufa is located in a zone of constant contamination by these super-toxins, a situation primarily due to the operations of the Khimprom Production Association of Ufa, which produces significant quantities of chlorophenol pesticides, including acid amino salt 2,4-D. Another source of environmental pollution by dioxin is the city dump, where uncontrolled disposal of wastes from the Khimprom Production Association and the universally used agricultural chemical amino acid 2,4-D has occurred. The condition of Ufa's water intake system prevents it from protecting drinking water against infiltration by toxic chemical compounds discharged into the environment by enterprises in the oil refining, chemical, machine building and instrument building industries. "The Ufa River, which serves as the city's main source of drinking water, is polluted throughout virtually its entire length by wastes from industrial enterprises in Chelyabinsk and Sverdlovsk oblasts and the Republic of Bashkortostan, thus creating a constant threat to human health."

The Bashkortostan Supreme Soviet Presidium adopted this resolution: "To appeal to the Russian Federation Supreme Soviet and Government in accordance with Article 51 of the Russian Federation Law on Environmental Protection, and to request that Ufa be declared an environmental emergency zone at the federal level." The presidium of the Bashkortostan parliament has demanded that the Government of the Russian Federation block the convertible currency accounts of enterprises in the Republic of Bashkortostan and establish a special tax on the convertible currency receipts of enterprises in the city of Ufa, with the funds thus raised to be directed to the financing of environmental facilities,

primarily those connected with drinking water supply and elimination of dioxin pollution in the city of Ufa.

The republic Supreme Soviet Presidium also instruct Ufa City Hall and the Bashkortostan Council of Ministers to review by 1 July technical proposals of ways to prevent infiltration by highly toxic compounds such as dioxin into the city's drinking water taken from the Ufa River, and also to assess the quantity and quality of other alternative water sources and monitor compliance with decisions by the public health service and the State Committee for Environmental Protection forbidding the production of pesticides based on amino salt 2,4-D at the Khimprom Production Association or the use thereof in agriculture in Bashkortostan. Furthermore, the decision was made to prepare a republic dioxin program by 1 September 1992 and to make provision in it for comprehensive study of highly toxic compounds such as dioxin. A plan of measures to protect the Ufa River watershed against industrial, agricultural and other sources of pollution as the city's principal source of drinking water must be completed by 1 July.

'Khimprom' Shutdown Sought

92WN0542B Moscow NEZAVISIMAYA GAZETA
in Russian 15 May 92 p 6

[Article by Radik Batyrshin: "Permanent Disaster in Ufa: The Average Citizen of Ufa Is 120,000 Times 'Tougher' Than an American"]

[Text] Spring is here, and dioxins have once again been discovered in Ufa's water taps. According to studies done by the Institute of Bio-Organic Chemistry imeni M. M. Shemyakin the concentration of dioxin in the Ufa River near the Southern Water Intake System was on 30 April six times higher than the reference permissible level; at the Northern Water Intake System it was higher than the permissible level by a factor of 1.3, at the Izyaksk Water Intake System higher by a factor of 9.0, and at the Demskiy Water Intake System by a factor of 4.3 above the reference permissible level. That means that the water in Ufa is not suitable for drinking purposes because it fails to meet public health standards. It is interesting to note that Soviet standards exceed American ones by a factor of 2,000. Consequently, in the Southern Water Intake System (which supplies water to approximately one-half of the city's one million people) U.S. standards are exceeded 120,000 times over.

"From a legal standpoint it is difficult to prove the effects of dioxin on human health," said Mars Safarov, doctor of chemical sciences and a Bashkortostan State University professor. "But in 1991 a total of 8,882 people in Bashkortostan were diagnosed with cancer-related illnesses. That was 602 more than in the preceding year. In 1981 there were 200 cases of cancer in Ufa per 100,000 residents, but by 1991 that figure had risen to 257. The effects of dioxins are categorized based on the number of cancer cases observed, and the carcinogenic effects of these substances on living organisms

are a proven fact. Dioxins also have a teratogenic effect, that is they damage fetuses in the mother's womb. The dynamics of this are terrible: over the past 10 years the number of birth defects among the city's children has increased by a factor of seven.

Water pollution is only part of overall dioxin pollution in the Ufa area; the main thing that must be done to halt that pollution is to shut down the huge Khimprom Production Association, incinerate its wastes and decontaminate the facility, because one kilogram of dust from the roof of Khimprom contains 0.33 milligrams of dioxins. That quantity of those substances is sufficient to create a dangerous runoff dose for half a million Ufa residents. The wind merely has to blow across the plant in the direction of the city and people can get that same dose of poison even though they are drinking clean water. In the opinion of experts, Ufa is faced with decontamination efforts in the Shugurovka River valley which will be unprecedented anywhere in the world (over an area of approximately 56 square kilometers). In that area dioxins have been discovered in the ground at a depth of 9.2 meters. Once a small dioxin leak in the Italian city of Seveso resulted in a 20-centimeter layer of topsoil being removed from an area of 17 square kilometers.

Trade Union Council Demands Closure of Ufa Herbicide Plant

92WN0544A Moscow TRUD in Russian 19 May 92 p 1

[Article by N. Kochergin: "Pouring Out Dioxin"]

[Text] In view of the urgent environmental situation in Ufa the Bashkortostan Federation of Trade Unions Council has demanded that the President of Russia and the chairman of the republic Supreme Soviet shut down the Khimprom Association's herbicide production facilities.

Two years have passed since the Federation Council and a number of public organizations in Bashkortostan first brought their demands to the attention of a governmental commission investigating phenol contamination of drinking water in Ufa. However, there has not been any improvement in the environmental situation to date. Moreover, recent analyses confirm the presence of dioxins in the water in amounts exceeding maximum permissible concentrations many times over. It has been learned that for a number of years now the citizens of Ufa have been drinking water containing the synthetic poison that is the most toxic of all to human beings, one which surpasses chemical weapons in terms of its destructive effects.

Demands that herbicide production facilities be shut down are being heard in Ufa more and more frequently. They were heard most recently at a May Day rally organized by the republic's trade unions.

In its appeal to the President the Federation Council also demanded that Ufa be declared an environmental emergency zone.

Finnish Firms Said Devastating Karelian Forests

92WN0459A Helsinki HELSINGIN SANOMAT
in Finnish 30 Mar 92 p 6

[Article by Johanna Mannila: "Difficulties in Karelian Environmental Protection"]

[Text] Finnish and Russian forestry practices have a meeting ground northwest of Lake Ladoga.

The screeching and whining Finnish forest harvest machine felled and lifted birch trunks Saturday at the forest harvest near Sortavala, northwest of Lake Ladoga.

The dense growth of 60-70 year old spruce has never been thinned. The harvest project looked typically Finnish except for the fact that less deciduous trees were left standing here than would be in Finland. They do want to leave the snags and decaying wood behind, however.

After this winter the site will be allowed a respite for about ten years. After the root systems have strengthened there will be a forest improvement harvest prior to a climax harvest which should yield splendid spruce logs. In Karelia spruce stands are allowed to grow 20 years or so longer than is the practice in Finland.

The birch trunks are transported on trucks along Finnish built forest hauling roads to Vartsila and from there to Imatra to become raw cellulose since Enso-Gutzeit cannot obtain enough birch fibers from Finnish sources.

Karelia, with its desperate need for foreign currency, has not fully understood the principles of Finnish forestry and thinning harvests. There is a danger of Karelia's forests becoming a homogeneous stand of spruce unless more birches and other deciduous trees are left standing than is being done at present.

Thinning Harvests a New Concept

"Russian tree harvests are basically clear-cut and climax harvests with thinning harvests accounting for only four percent of the volume. In Finland 40 percent of total harvest volume comes from various kinds of thinning harvests," summarizes Ilkka Kallio, deputy manager of Enso-Gutzeit's cooperative project, Ladenso.

"The Russians have not yet realized the value of birch and that is why they demand it be cut. To them only the spruce logs have value. It also sounds like the forest harvesting firms are now too much afraid of clear cuts and have not thoroughly considered the consequences of thinning by removing the birch," criticizes docent Tapio Lindstrom, a researcher specializing in virgin forests who works for the Water and Environment Agency.

"The Russian practice of clear cutting in strips that are two kilometers long and 100 meters wide is not all bad from an ecological standpoint. The regeneration occurs easily and naturally from both edges; first comes the birch and then the spruce. I see a greater danger in establishing a one species forest. You do not have biological diversity in such."

"The Finns are now skimming the cream off the top. Twenty years or so from now Finns will be able to get enough birch fiber from Finland once today's sapling stands are mature for harvest."

Forests Near the Lake Ladoga Shoreline To Be Preserved

The operation zone for Ladenso, Enzo-Gutzeit's cooperative project consists of 360,000 hectares near the north-west extremity of Lake Ladoga, in the Sortavala and Pitkaranta regions.

"50,000 hectares of the region has been set aside as a nature preserve but the exact borders of the preserve have not been defined. The area to be preserved includes islands in Lake Ladoga and a two kilometer wide band paralleling the shoreline. In addition, only thinning will be performed in sheltered strips 500-1,000 meters wide along rivers and creeks," reports Enso-Gutzeit's forestry division manager Voitto Polkki.

According to Polkki sites with environmental preservation significance such as rugged, rock outcrop knolls as well as glades with rare plant species will be left outside the harvest zone.

"We have left decaying trees behind for the woodpeckers and insects. We also plan to leave unharvested any areas that are sensitive from an aesthetic standpoint," assures Ilkka Kallio. Ladenso has already paid over 100,000 rubles in fines because of the decaying trees. Russian forestry stipulations emphasize a clean-up of the forest. "The Russian cutters have had a hard time understanding why the mountain ash and juniper must be left uncut."

According to Kallio it is possible to interlink the differing forestry practices of Russia and Finland even though there are plenty of difficulties. "The actual professional skill level is basically the same but the Russians work a shorter day than the Finns do." At night the equipment must be kept in a guarded enclosure.

In addition to Enzo-Gutzeit Karelian forests are being thinned and clear-cut near Viipuri by Tehdaspuu, Inc.'s cooperative project Tepules and in the Kostamus region by Veitsiluoto Inc.

Yeltsin Issues Decree on Habitat Protection for Arctic Minorities

92WN0486A Moscow ROSSIYSKAYA GAZETA
in Russian 27 Apr 92 p 6

[Text of Decree No. 397 signed by Russian Federation President Yeltsin in Moscow on 22 April 1992: "On

Urgent Measures for the Protection of Places of Residence and Economic Activity of the Minority Peoples of the North"]

[Text] With the goal of ensuring the legal rights and interests of the minority peoples of the North, of preserving and developing their traditional forms of economic activity under conditions of a transition to market relationships, and also of the creating additional mechanisms for ensuring ecological protection in regions of industrial development in the North, I decree that:

1. The Councils of Ministers of the republics comprising the Russian Federation and the organs of executive authority of the krays, oblasts, and autonomous okrugs in which minority peoples of the north reside, jointly with regional associations of the minority peoples of the North, shall:

- in places of residence and economic activity of the minority peoples of the North, determine areas of traditional natural resources utilization that are the inalienable property of these peoples and that, without their agreement, may not be appropriated for purposes of industrial or other development not connected with traditional economic management;

- transfer, without charge, of reindeer pasture, and hunting, fishing, and other lands for complex utilization (reindeer herding, hunting, fishing, the hunting of marine mammals, gathering of berries, mushrooms, nuts, medicinal plants and other uses) to clan communities and families of minority peoples of the North that are connected with traditional sectors and industries for lifetime, hereditary possession or lease and to kolkhozes and sovkhozes—for continual (indefinite) utilization or lease;

- afford preferential rights with regard to the conclusion of agreements and the receipt licenses for utilization of restored natural resources to clan communities, families, and individual representatives of minority peoples of the North in places of traditional use of natural resources by them;

- to determine the boundaries of areas in which traditional types of economic activity are practiced by minority peoples of the North, with the goal of ensuring nonexhaustive utilization of natural resources.

2. The government of the Russian Federation shall:

- define more precisely and, before 1 August 1992, submit changes to the list of regions of residence of minority peoples of the North to the editorial staff of RSFSR Council of Ministers resolution No. 485 of 2 December 1987;

- develop and approve, following established procedures, rules for the utilization of lands and other natural resources in areas of traditional natural resource utilization by the minority peoples of the

North, having made provision within these for carrying out production activities only when positive conclusions by state ecological experts exist;

—introduce before 1 October 1992, jointly with the Councils of Ministers within the Russian Federation and with the organs of executive authority of the krais, oblasts and autonomous okrugs, a proposal for the establishment of national (state) parks and game reserves in regions of the extreme North and localities equated with them;

—by the end of 1992, prepare and submit to the Supreme Soviet of the Russian Federation draft laws "On the Legal Status of the Indigenous Peoples of the North" and "On the Legal Status of the National Rayon, the National Rural and Village Soviets, and the Clan and Community Soviets of the Indigenous Peoples of the North."

'Plundering' of Gas Reserves Scars Arctic Environment

92WN0521B Moscow ROSSIYSKAYA GAZETA
in Russian 13 May 92 p 5

[Article by R. Purtov, section head of the Committee on Economic Administration of the Yamalo-Nenets Autonomous Okrug: "The Arctic Variant of Chernobyl"]

[Text] The Arctic is the mineral and raw material reserve of the Russian Federation. R. Purtov, department head of the Committee on Economic Administration of the Yamalo-Nenets Autonomous Okrug, writes to ROSSIYSKAYA GAZETA editors about the problems of its plunderous exploitation.

The Yamalo-Nenets Autonomous Okrug, the Arctic region of gas and oil extraction, plays a significant role in the Russian Federation's fuel-energy complex. The foundation for industrial assimilation of gas extraction in the okrug was laid in 1972 with the exploitation of the gigantic "Medvezhya" gas deposit and the laying of the first segment of the Nadym-Unga-Center main gas pipeline.

Today the volumes of annual gas extraction in the okrug comprise around 550 billion cubic meters, which is 1.3 times greater than the entire all-union extraction for 1980. In 20 years, 4.7 trillion cubic meters of gas have been extracted in the okrug. Such rapid growth rates for extraction are quite unique.

The region was assimilated by the focal method, with orientation toward development of only the rich deposits which required minimal expenditures for extraction. The course toward accelerated development of the region's natural resources, which rested on administrative rather than on economic methods of management, was implemented by the ministries and departments without a multi-variant scientific substantiation of the projects for the long-term perspective.

As a result of the irresponsible exploitation of the deposits, in Purovskiy Rayon alone, 3.5 million hectares of Iceland moss covering were destroyed, and in Nadymskiy rayon—around two million. Today the Yamal Peninsula is next.

Even before construction of the railway to Yamal began, geological survey operations on the peninsula took out of operation over 10,000 hectares of land covered with Iceland moss and land which was important for hunting and trapping.

The governments, one after the other, scooped out of the far from bottomless depths the funds needed for realization of exotic projects, for eating up, or simply for plundering, and left practically nothing for the development of the sector, not even for the restoration of the damaged environment.

In spite of the accelerated development of the oil and gas industry in the okrug, environmental protection measures have essentially been ignored there. The cost of developing the Bovanenkovskiy deposit on the Yamal Peninsula was estimated at 8.8 billion rubles (R) (in 1982 prices), while the amount of loss inflicted upon the environment over the standard time of developing this deposit will comprise over R5 billion, according to the data of the Academy of Sciences Urals Scientific Center.

The forced development of the gas deposits on the Yamal Peninsula will inevitably lead to unjustified expenditures, unreliable operation and a rapid transition to a regimen of declining yields and catastrophic ecological losses, in essence to an Arctic variant of Chernobyl.

A study of the technical documentation on development of hydrocarbon raw material resources on the Yamal Peninsula, conducted by a panel of experts from the former Union Goskompriroda [State Committee on Nature] Main State Expert Commission, resulted in the decision to cease all construction-installation operations for developing deposits or building gas pipeline systems and railroad lines to Yamal, and to cease all other operations associated with the construction of industrial facilities. However, as has always been the case with us, the opinion of the scientists was ignored.

Russian Federation Government Resolution No. 93 dated 17 February 1992, "On Immediate Measures for Normalizing the Situation in the Republic's Oil and Gas Industry," proposes that the Ministry of Fuel and Power and the Ministry of Ecology and Natural Resources develop within a three-month's time a program for the operational introduction of new oil and gas deposits for the period 1992-2000, providing in it the necessary measures for stimulating the accelerated operational introduction of these deposits. The government is new, but the policy of the essentially unpunished colonial plunder of natural riches is old.

The outlined accelerated development of the gas and oil industry is a course toward the extensive development of the sector. Yet an alternative to this may be the annual

savings of up to 100 billion cubic meters of gas through the development of available energy-saving technologies and reduction of direct losses.

The time of the giant deposits in the Far North is passing. Now we will have to develop deposits with medium-sized and small reserves, with low productivity of the strata. The development of such deposits, especially oil deposits, requires drilling a large number of wells, special equipment, materials which are in short supply, and special technological means of increasing stratum yield, i.e., all the things we do not have.

The basis for continued development of the economic activity in the Arctic regions must be the effective application of the fuel-energy potential, economic substantiation of the need for involving Arctic resources into assimilation, and determination of rational volumes of extraction. In this connection, the introduction of free prices on energy resources may introduce corrective factors into the volumes of their extraction in the Arctic zone and bring about a definite slowing of the application of nature in the Arctic.

The rejection of plunder of the Siberian depths will signify primarily a transition to civilized environmental application. The present load on the nether regions does not fit into civilized standards.

The RSFSR law, "On Environmental Protection," places the accounting, evaluation of the status and planning of utilization of natural resources, as well as the issuance of permits for the right to exploit the depths, within the competence of the autonomous okrugs. Our main task is to bring the levels of oil and gas extraction in the okrug into strict correspondence with the scientifically substantiated norms within the near future. But will the law work in our far from legal state, when effective government resolutions contradict adopted legislative statutes?

Legal standards do not operate automatically. They require application through a mechanism of state organs of administration and control, through the organs of the prosecutor's office and the courts, through the court of arbitration, and through public organizations and associations.

There is growing pressure on the part of the gas and oil monopolies and the government to increase the rates and volumes of extraction. We must fight. We must leave at least something of the nonrenewable natural riches to our future generations.

WESTERN REGION

Byelarus Scientists Find New Method To Protect Crops From Radiation

LD0805175892 Moscow *ITAR-TASS in English*
1031 GMT 8 May 92

[By BELTA correspondent Dmitriy Patyko for TASS]

[Text] Gomel, May 8 (TASS)—Ecologically safe crops can be raised in soil contaminated with radionuclides, if the ground is covered with a thin layer of special sawdust, according to scientists from the Institute of Mechanics of Metal-Polymer Systems at the Byelarusian Academy of Sciences and their colleagues from the Byelarusian branch of the Agricultural Radiology Research Institute. The scientists who came up with this original method of protecting crops from irradiation developed a means of impregnating sawdust with special chemical substances that bind molecules of heavy metals, making them inaccessible for crops.

Experiments with wheat, rye, beans, cucumbers and peas showed that using this method reduces the content of radioactive caesium in vegetables by several times. The contamination level of the resulting crops is lower than the "provisional" safety norms, established after the Chernobyl accident, and measures up to the highest international standards.

"We used chemical compounds known to specialists but were not adopted for practical use, because it was impossible to cover soil with them in an even layer and to spend them sparingly," said Boris Kupchinov, head of a laboratory at the Institute of Mechanics of Metal-Polymer Systems and corresponding member of the Byelarusian Academy of Sciences. "When we impregnated sawdust, which is cheap, has a porous structure and, consequently, a large surface area, with radionuclide-absorbing substances, we resolved this problem. Only three grams of the chemical substances are needed for impregnating one kilogram of sawdust, which is enough to cover two square metres of ground. The technology is not intended for large fields, but everyone can spread the sawdust evenly over his vegetable garden and mix it with soil to the depth of about three centimetres, using a rake, for example. The concentration of radionuclides is the highest in the upper three-centimetre layer of soil."

Scientists have already carried out the research programme on this subject and drawn up a plan to fit the Plastmassovy Zavod production amalgamation of Gomel with special equipment for impregnating, drying and packing the sawdust.

Growing of Opium, Marijuana in Chernobyl Zone Alleged

92WN0529A Moscow *KOMMERSANT in Russian*
No 14, 30 Mar 92-6 Apr 92 p 2

[Unattributed report: "Consequences of the Chernobyl Disaster: Radioactive Drug Addiction?"]

[Text] The raw materials for the production of opium and marijuana are being grown in the radionuclide-contaminated zone around the Chernobyl AES [nuclear electric power plant]—this is the information obtained by two private, independent groups. This information is now being examined by experts at the United Nations Organization.

It is believed that representatives of the International Program for Control of Narcotics (a specialized agency of the U.N. based in Vienna) will visit Ukraine, Russia, and Central Asia in April for an on-the-spot assessment of the situation with transport of narcotics from the former Soviet republics to the West.

The first investigation of cases of illegal planting of narcotic plants in the 30-kilometer Chernobyl zone was done on the initiative of a private Moscow group called the International Association for the Fight against the Distribution and Use of Narcotics. The Association has sufficient grounds to believe that this year, just like last year, poppies and hemp, which are the raw materials for the production of narcotics, have been planted in the unpopulated radioactive area. Representatives of the Moscow group reported that their information is fragmentary because they are encountering resistance from the local authorities.

The information of the Moscow association was confirmed by the Observatoire Geopolitique des Drogues, a French group whose work is financed by the EC and French Government funds. The group engages in publicizing information on the movement of illegal narcotics throughout the world. According to their information, a significant amount of plantings of radioactive opium poppies has been recorded all along the perimeter of the 30-kilometer zone. The sizes of the poppy heads, in the words of representatives of the group, are twice as large as normal.

Representatives of the International Program for Control of Narcotics announced that they do not have information that allows them to say that the Chernobyl zone has any kind of special role in the distribution of narcotics, but they have included it in the itinerary of their trip through the CIS countries, planned for April.

THE INTERNATIONAL HERALD TRIBUNE reported, however, that it had received confirmation of the information of the Moscow and French groups from an official of an unnamed agency, who wished to remain anonymous. This information is based on expert examination of the narcotic raw material.

Work of Detecting Unidentified Radioactive Spots Continues

92WN0531B Kiev PRAVDA UKRAINY in Russian
8 Apr 92 p 3

[Interview with Vyacheslav Shestopalov, director of the Scientific Center of Radio-Hydro-Geo-Ecological Studies of the Ukrainian Academy of Sciences, by Dmitriy Kiyanskiy, date, place, and occasion not indicated]

[Text] Unfortunately, people quickly become accustomed not just to the good, but also to the bad. Already today information on Chernobyl seems to be moved out to the periphery of our consciousness. That is probably why we are not more indignant when we see fish caught in the Kiev

Sea being sold in the city and why we are not surprised that they have long since stopped watering down the streets and now the spring winds lift the dirt accumulated during the winter up into the air. But still, the invisible danger remains; it is right next to us. We can, so to speak, touch it with our hand. Our Ukrinform correspondent talks about this with Vyacheslav Shestopalov, director of the Scientific Center of Radio-Hydro-Geo-Ecological Studies, deputy director of the Institute of Geological Sciences of the Ukrainian Academy of Sciences, and a corresponding member of the Academy.

[Kiyanskiy] Is it possible today, 6 years after the Chernobyl tragedy, to find spots of radioactive contamination that still have not been identified?

[Shestopalov] The question is one of dimensions. The sectors more than a kilometer across have generally already been recorded. But ones that are 50-100 meters can still be found in many places. Are they dangerous to the population? It all depends on where these spots are located. For example, if they are in a forest or ravine that is one thing. When they cover a farmstead, a dairy unit, or—God forbid!—a children's playlot, that is completely different. That is why house-by-house inspections are continuing in the northern oblasts of Ukraine. Incidentally, radioactive spots are being hunted today in Vinnytsa, Ternopol, and Chernovtsy oblasts as well.

[Kiyanskiy] Suppose they found such a sector and warned the population. What next? Decontamination?

[Shestopalov] As experience shows, mechanical methods are, first, ineffective, and second, expensive. The thing to do is something else. If we know about the spot we can take a few precautions: move the children's playlot to a different place, not continue farming there. If such a sector is in the forest, gathering mushrooms there is categorically prohibited. And it also must be considered that spots are not the same in terms of quantity of fallout nuclides. Usually the further they are from Chernobyl, the lower their activity is. But there are exceptions too. One of our associates recently was on a work trip to Poland and visited a dacha with friends. "If you want, I can take a radioactivity sample from your orchard," he suggested to his hosts, half-joking. So a handful of soil from near Cracow came to Kiev. Imagine the surprise of the specialists when, for content of nuclides, it differed little from local soil.

[Kiyanskiy] Vyacheslav Mikhaylovich, what layer of the soil are they located in?

[Shestopalov] The bulk of the radioactive substances are in the top 5-10 centimeters. They penetrate deeper at a very slow rate, 1-2 centimeters in 5 years. Geochemists, geomorphologists, and landscape scientists are now identifying the most dangerous paths of nuclide migration with surface runoff—those selected "routes" by which they travel, especially in the spring with the snowmelt.

[Kiyanskiy] What practical benefit does this work give us?

[Shestopalov] Really it is just getting underway. Specialists are studying the horizontal paths of migration and the secondary concentration of radionuclides in the most contaminated territory of the republic. It is the job of the scientists to determine how active and how dangerous these processes are. The result will be a series of maps which will show the paths of possible transfer of radionuclides and their secondary precipitation.

[Kiyanskiy] Immediately after the accident at the Chernobyl AES some specialists thought that isotopes of plutonium would not be found outside the 30-kilometer zone. But then last year a map of the contamination of Kiev with plutonium was published and it turned out that the concentration of plutonium in certain rayons of the city is dangerous for the population. How do you assess these preliminary data?

[Shestopalov] Despite the opinions of some noted scientists, within 2 years of the accident hotspots had already been detected not only in the 30-kilometer zones, but also much further away, for example in Rovno Oblast. It became clear that finely dispersed particles of plutonium had been carried great distances. As for the map of Kiev, the presence of plutonium was indeed found at the points where samples were taken. And, as they say, that is nothing to add to that.

But here is the problem. At that time they took only a little more than 200 samples in the city and, from my point of view, compiled the map in a completely incorrect way. Suppose that it is possible to detect a hot part with high radioactivity at some point, and literally right next to it you can take another sample which proves to be clean. But with such variance and taking just a few samples in a certain rayon you cannot apply the results to a large territory or an entire development.

Of course, the very fact that plutonium is found requires a careful study of the territory of the city. But the study will have to be much more detailed. In sectors with an increased concentration decontamination should be done without delay. Such work is already underway. For example, in Obolni next to the Institute of Hydrobiology of the Ukrainian Academy of Sciences contaminated ground has been covered with a new layer of soil.

Considering the relatively small number of samples taken in the study of the territory of Kiev and the preliminary, precautionary so to speak, nature of the conclusions about contamination of the terrain with radionuclides of the plutonium series, the Government of Ukraine has appropriated money for a large-scale study. The work has been assigned to PGO Sevukrgeologiya [Northern Ukraine Geology], which is supposed to involve a number of institutes of the Ukrainian Academy of Sciences. Plans call for taking more than 1,000 soil samples and studying bottom deposits from the Dnieper and Desna rivers, Dnieper beaches, and curbside accumulations of dust for plutonium.

I would like to make one other important observation here. Plutonium in the soil is not terrible in itself. It is a

different matter when particles of it are carried off by the wind. The maximum permissible concentration of plutonium in the soil differs from the figure for the air by 3-4 orders. It is very dangerous when hot particles get into the lungs and begin intensively exposing the adjacent tissue, giving off dosages running into thousands of rads on the micron level. Therefore it is essential to water the streets of the city in the early spring after the snow melts. But for several years now this has not been done, and the wind is lifting clouds of dangerous dust into the air.

[Kiyanskiy] The quality of drinking water has significantly worsened in recent times. Among other things, Kiev newspapers have run reports in which residents of the city are advised to use water from underground springs for drinking and food preparation. But the general exacerbation of the ecological situation affects them too. Couldn't radionuclides and heavy metals get into the lower horizons?

[Shestopalov] The degradation of Dnieper and Desna waters is a common phenomenon, characteristic of our other rivers too. I would not single out radionuclides here as something special. Already several years before the accident at the Chernobyl AES when much information about the state of the environment was super-secret, the republic ministers of municipal services and public health addressed a letter to the government about the sharp worsening of water quality in the Dnieper and Desna, tying this to the discharge of fertilizer, pesticides, heavy metals, and other organic substances into the rivers. Then radionuclides too were superimposed on this background. Also I should note that the quantity of them in the water does not exceed the maximum permissible concentration.

[Kiyanskiy] But our maximum permissible levels are more rigorous...

[Shestopalov] The temporary levels introduced right after the accident were in fact quite severe. But I have in mind the usual ones that were in effect until 1986. Therefore, we should not talk so much about the danger of water contamination with nuclides as about the total impact of the substances in it, including radioactive cesium and strontium.

But if we talk about underground sources, which are protected against radioactive contamination much better than rivers and lakes, nuclides do reach them too. Surface waters become contaminated quickly, but they cleanse themselves intensively. Underground waters, however, preserve their cleanliness for a long time, but when they have started becoming contaminated they stay that way for a long time. Therefore, we should be especially cautious with them; unfortunately, many economic managers cannot understand this. First the water-bearing horizon closest to the surface, which is used for water supply for rural residents, becomes unusable. As a result the maximum permissible concentrations of nitrates, nitrites, and pesticides are exceeded in their

wells dozens of times. People are actually drinking a poison boullion which affects the kidneys, liver, and other organs. This is where the alarm needs to be sounded!

In the cities, for example in Kiev, the water being used is from deeper, artesian horizons where many fewer pollutants reach.

[Kiyanskiy] But in that case, why have just 16 water collection columns been opened in the Ukrainian capital, and many Kievans have to travel to the other end of the city to use them? After all, following the Chernobyl disaster 70 reserve wells were drilled and then mothballed.

[Shestopalov] Municipal services specialists are examining them today. Unfortunately, many of them cannot be used. But let us put it bluntly, this work is very important for Kiev and should be speeded up greatly! After all, things do not wait: the quality of water in the city water system leaves much to be desired.

German Firms Help With Plan To Treat Children of Chernobyl

PM0605102792 Moscow IZVESTIYA in Russian
5 May 92 Morning Edition p 2

[Mikhail Shimanskiy report: "How To Save Sick Children"]

[Text] Minsk—The Byelarusian Supreme Soviet parliamentary commission on the problems of the Chernobyl disaster and the "Chernobyl" union have prepared a plan to save children together with the major German firms "German Soyuz-Consulting" and "Heinkel."

The main point is to construct as swiftly as possible educational and treatment sanatoriums on ecologically clean territory in Byelarus. The initial cost of one sanatorium is estimated at \$25 million. In all, 46 such sanatoriums are necessary to treat the children of Byelarus. They are suitable for use all year round and provide classrooms.

The parliamentary commission made an appeal to parliaments and the governments of states, businessmen and entrepreneurs, leaders of charitable and public organizations, and civil initiatives. The appeal says in particular that in six years agricultural amelioration measures and decontamination have been unable to cure the ills of the sick Byelarusian land, on which more than 70 percent of the radionuclides discharged by the nuclear volcano at the Chernobyl Nuclear Power Station landed. Almost 25 percent of the republic's inhabitants are today living in regions contaminated by radiation. And 112 schools and 90 preschool establishments are still in the accident zone. Almost 600,000 children each year need therapeutic vacations in clean regions. Byelarus is, however, not in a position to provide everyone with proper vacations and treatment. Moreover, the children have to

all intents and purposes been deprived of the opportunity of being treated in other republics of the former USSR in connection with its disintegration.

The statistics for the growth in children's illnesses in the republic are becoming more and more alarming.

Chernobyl Commission Chairman Reflects on Lesson of Chernobyl

92WN0489A Kiev NARODNA HAZETA in Ukrainian
No 15, Apr 92 pp 1-2

[Interview with Volodymyr Yavorivskyy, chairman of the Parliamentary Commission on Questions of the Chernobyl Disaster, by Anatoliy Zubkov: "White Blood Cathedral"; date and place not given]

[Text] *The twenty-sixth of April marks six years since the biggest (according to a statement put out by the Ukrainian National Rukh and the Green World Association) ecological disaster in the history not only of Ukraine but of all mankind—the explosion in Unit No. 4 of the Chernobyl AES [nuclear power plant].*

It is our duty never to forget that terrible date of Chernobyl, the horror that was brought on by the totalitarian, humanity-hating communist regime. On Terrible Friday there will be rallies and requiems all over Ukraine in memory of the victims of the nuclear genocide.

The tragic lesson of Chernobyl, and the future portended by the "peaceful" atom—these were the topics of a discussion between our correspondent and Ukrainian People's Deputy Volodymyr Yavorivskyy, who is chairman of the Parliamentary Commission on Questions of the Chernobyl Disaster.

[Correspondent] Mr. Volodymyr, is it not symbolic that our national day of tragedy this year falls on the first Easter—the day of Christ's Resurrection—in the history of independent Ukraine? Can it, in truth, be a cosmic sign that our free state is to rise again and be reborn to a new life?

[Yavorivskyy] May God grant it. In fact, if you and I think back to 1986 we will recall that Easter fell several days after the Chernobyl disaster. At the time the accident seemed like a sign of God's wrath against the foolish race of men....

[Correspondent] People were also recalling the prophecies of the Apocalypse....

[Yavorivskyy] Yes, as well as the "Wormwood Star" and the words about water wells turning bitter. Indeed it did seem like a punishment because human beings who had explored the secrets of nature and achieved unique heights of civilization proved incapable of using them wisely. Much less in a society with no democracy. For me, anyway, Chernobyl's greatest lesson is that an achievement of human intelligence as colossal as the splitting of the atom, and nuclear energy, must never be

entrusted to an undemocratic society. Because it will inevitably end with Chernobyls and greater or lesser disasters....

I emphasize that Chernobyl did not happen by chance. It was a portent [znamennya]. And the fact that this year the church calendar and the calendar of our fate coincide so exactly is something that I would regard as a kind of new portent—perhaps of forgiveness, if you will, granted to the Ukrainian nation, which has had the wisdom to say it wants to be a nation, to build its own independent and democratic state. I repeat—democratic, and not some other variant of statehood. We not only can but must see this as a good sign, although I frankly do not see any powerful reasons for exaggerated optimism or rosy view of the situation, knowing the real picture as I do and having basically complete information about Chernobyl.

Here's why. Finally, some realism in looking at things. Formerly it was much easier for us: we could nod at Moscow and blame everything on them—you know, "Well they do this and they do that," etc. Maybe it was so, but now the whole burden of responsibility rests with us; there is no one else to blame. Therefore, we face an unbelievably tough task—that of putting things in order here in this zone, exploring new directions, deciding what has to be done next....

[Correspondent] Right now Chernobyl AES's Unit 30 is shut down for routine maintenance; next year the plant is going out of operation entirely. Yet the devastated zone will remain, the lethal buildings contaminated with radiation. There is the atomic fuel, the uncounted tons of radioactive waste. Is Parliament's Chernobyl Commission doing anything with the scientists to investigate the possibilities of reviving the area and liquidating that cancerous tumor on the body of Ukraine?

[Yavorivskyy] There are a number of problems that are entirely autonomous. For example, it is an especially tempting idea to talk of reviving the area, and it must never be forgotten. But, however sad it is, this is, so to speak, the second or third phase of the problem of restoring the life of the devastated Ukrainian Polesya, that unique region in the heart, the body of Ukraine. The most important thing now is not to let that deadly rot creep any further. We have to halt the migration of radioactive contamination. To talk of any revacuation, the way our ex-micro-hetmans carrying party cards rashly did, would be madness. That will take decades, possibly centuries. Before that, however, we need to get a move on and start solving problems today. What problems? We have to conserve water for Ukraine. It is already in danger. You know that under the weight of that "jacket" that was thrown over it, Unit 4 is sinking. It's clear now that the site for the Chernobyl AES was disastrously chosen—an area bounded by three mighty Ukrainian rivers, where the ground water is close to the surface, where the ground is too unsteady, soft, marshy, and shaky to bear the enormous concrete burden of four power plant units and the town of Prypyat. There are

already signs that the contamination is getting down into subterranean waters, while the ground water is totally contaminated and is flooding the Rudyi Lis and 800 temporary radioactive waste burial sites which were hastily scattered all over the area. No one is protected against the possible permeation of radioactive contamination into deep waters, and then all Europe will have a drinking water problem.

Everything being washed by rain and floods in the 30-kilometer zone is accumulating in Kiev Sea. One way or another the sea is acting as a kind of filter, but still the contamination is being moved by the Dnepr. This is a big problem, one which could lead to another disaster. I don't want to scare anyone, I'm just telling the truth as I know it.

One of the most difficult problems is that of the burial sites, which will have to be dealt with soon. It is clear now that the usual "come on, come on!" type of communist rush job, in which human life is worth almost nothing, and everything is done hastily and unprofessionally, has resulted in the need to move all those deadly burial sites. But there are some grounds for optimism. We have almost decided on one site. I don't want to give the exact address yet, because a few adjustments will have to be made to avoid mistakes. There are areas on Ukraine's granite shield—not far from the zone, incidentally, because we don't have the right to transport contaminated soil to other places. Long-term burial sites will be set up there. But you yourself understand what kind of strong engineering structures it will take, and strictly controlled ones too.

The Canadian variant of storing wastes has also been suggested, in what might be called a suspended, above-ground state. It is said that burying them in the ground is like an ostrich sticking its head in the sand. Well, these are problems which our scientists are working on. They include the matter of storing the equipment which was used to mop up the consequences of the disaster, and the debris, also what are known as "khayaty" (the customary Russian form of nuclear waste repositories). The ones at Chernobyl are just about too full. Now the dismantling of Unit 2 is underway, which was shut down after the accident. Next year we will shut down the third and final unit.

[Correspondent] Is it a question of dismantling the whole plant, all the equipment?

[Yavorivskyy] Certainly; otherwise it would be like going just half way. The whole plant needs to be dismantled, moved away, and de-activated. Imagine how many thousand tons of concrete, scrap, and trash there will be to dispose of safely. So it's a colossal problem. The Commission and the scientists are hard at work. Although our Commission is a legislative organ, and there has been silence about Chernobyl for almost five years, the Commission is now involved in everything—monitoring, legislation, the search for alternative sources of energy, and work with foreign experts and firms.

[Correspondent] With regard to alternative sources of energy, are there any signs of a change in the concept of nuclear energy development in Ukraine?

[Yavorivskyy] You know yourself that it is one thing to bury all that money and the toil of our people and call all nuclear plants a lost cause. Another aspect is that we have to keep in mind Ukraine's energy famine. We don't have enough gas and oil to substitute for nuclear power. The Americans already have a number of plans for converting nuclear plants to gas relatively easily. But that does require the availability of gas.

[Correspondent] And Turkmenia has shut off the gas to Ukraine, and Russia is going to play the "gas card" too....

[Yavorivskyy] Yes, one problem leads to another. But there is no reason for hopelessness and pessimism. After all, scientists of Ukraine and the whole world are getting involved quite intensively in these matters of concern to us; Ukraine can't make a breakthrough on its own. Here's what I'm driving at: over several decades there has been developed a worldwide "nuclear lobby" headed by IAEA [International Atomic Energy Agency], which has vast funding and, naturally (I spoke of this in my address to Parliament), it tends to hamper the development of alternative directions in the search for energy sources. It has been done quite openly, with enormous capital backing on a world scale. I think we have now broken IAEA's grip somewhat, and I believe Ukraine and other countries can see that the path that was foisted on us, without alternatives, leads to disaster. So the search for alternative energy sources is going to be vigorous.

[Correspondent] When thinking about the future fate of the "zone," the question of what to do with the big city of Prypyat, and the villages located there, comes up.

[Yavorivskyy] Yes, Prypyat is a ghost town engulfed in deadly contamination and spewing out deadly radiation. It cannot be left that way. There are various options and approaches. Some people propose cleaning up a few buildings to house specialists who will work on the dismantling of the AES. I believe this is absolutely unacceptable; we simply don't have the right to risk people's health. Another option is to raze the town. But that will involve incredible amounts of money. The future will decide.

[Correspondent] After the plant is shut down entirely?

[Yavorivskyy] I want you to know that after the plant is closed down, in 1993, the cores will be removed and atomic energy generation will cease. The dismantling itself will take several years. It's going to be very painstaking work. Incidentally, the high-power channel-type reactors installed at Chernobyl are especially hard to dismantle, harder than any others. So we have another "joy" to face. And of course there's the problem of manpower, the "squatters" [samosely], and the town of Slavutych—although I'm convinced that Slavutych can be cleaned up and made completely safe for human habitation. Certainly we need to think about the plant's

collective, how to take care of them, not artificially, by handing out rubles indefinitely, but by creating a new production base where these qualified specialists can work.

There's an enormous amount of work to be done—methodically, by stages, and there's good reason to be hopeful. I'd like to say that it was independent Ukraine—literally in the first days of its independence—that took a very important step by announcing an international competition for the best plan to dismantle and neutralize the Ukryttya [Shelter] facility. I was pleased to see that solid firms applied to take part in the competition; it's an interesting idea. We sense that we are not alone, that the world is with us. If we were still in the Union, no one would do that, because Moscow couldn't care less about our problems.

[Correspondent] Mr. Volodymyr, I'd like to return to the Chernobyl theme. Recently NARODNA HAZETA published a disturbing report about the fate of several hundred families of our countrymen, former residents of Prypyat, who were removed from the danger zone very soon after the accident and taken to what was then the Moldavian SSR. At the time, in 1986, the evacuees were told that it was temporary and that they would later return to Ukraine. Hundreds of families were also removed to other republics. Now, the USSR is no more. The states where these people live are independent. And, against their will, our countrymen are stuck in the role of emigres. These people keep appealing to various state organs of Ukraine, including your Commission, asking to return to Ukraine, but in vain. How is their fate to be decided?

[Yavorivskyy] That too is a serious problem, a misfortune. You'll recall that during that tragic time, official ignoramuses deliberately lied and told people they would only be evacuated for about three days, at most a week. The fact that they were evacuated outside Ukraine did have its logic; at least they were being taken where settlers could be accommodated. I have met them; I understand them and my heart aches for them. It is one thing when someone leaves his fatherland by his own free will; it is another when tragedy has cast him out. Of course the problem of repatriating our evacuated countrymen must be resolved. But how can we do it with a "wave of the hand"? We simply don't have the housing now. There are over 600 Chernobyl families living in Moldova alone, and thousands more in other countries. We'll have to be patient for a while yet.

At this point I want to inject a little nuance. I talked with a group of Chernobylites in Moldova. Fate took them to live in Moldova, where complex political processes are taking place. The little country is fighting for true independence—in effect, against imperialist expansion. Wouldn't it be logical to support the people who took you in? And I asked, "What is your attitude toward Moldovan independence? Are you in sympathy with the people?" They answered [in Russian]: "Why should we support the Moldavians? We're Russian speakers!"

So there you have it. It's sad that our countrymen are still so quick and willing to become part of the faceless mass of "Russian speakers."

But let's take another look at the question. Of course we will do everything we can to help bring our citizens back to their native land, to other Ukrainian cities. But now it will have to be done on the basis of international treaties with Moldova and other independent countries. All the Chernobylites who really want to will eventually come back. We will not forget them. After all, they're our citizens.

[Correspondent] Let's hope that all citizens of Ukraine will have more festive than mournful days in store. Let's hope a genuine rebirth awaits our people.

[Yavorivskyy] Yes, let us hope that Easter this year marks the beginning of that Rebirth. But near the end of every April the tears of Chernobyl always flow. It can never be forgotten. It is not by chance that our Commission has initiated the construction of a Cathedral of the Virgin of Chernobyl in Kiev. I would call it the White Blood Cathedral. There should be a mosque and a synagogue near this Christian cathedral too. We would like to have the remains of Ukrainians who perished in the disaster to be brought there from Moscow—so that people of various faiths and religions can come there, remember them, and pray for our whole nation.

Former Chernobyl Director Puts Blame on 'Entire System'

92WN0523B Kiev PRAVDA UKRAINY in Russian
21 Apr 92 p 3

[Interview with Viktor Bryukhanov, former director of the Chernobyl Nuclear Power Plant, conducted by Ukrinform correspondent Dmitriy Kiyanskiy: "So Who Is at Fault After All?"]

[Text] I was met by a thin, completely grey-haired man with a quiet voice, as if extinguished. Life had etched a spiderweb pattern of deep wrinkles onto his face. It was only his lively and expressive glance that convinced one that the reserves of his spiritual energy were still far from exhausted. Six years ago, before that terrible day which drastically changed many thousands of lives, he did not have a single grey hair on his head...

Is it really worth dredging up the past, doubted my interlocutor? Is it worth once again returning to the bitter thoughts, once again reliving the tragic events of the Spring of 1986 and the six years which followed, and which were also equally difficult for him? Nevertheless, he agreed to meet with our correspondent. After all, many questions associated with the accident at the Chernobyl Nuclear Power Plant still remain open to this day...

[Bryukhanov] "The news of the extraordinary occurrence (as yet no one at the plant knew about its actual scope) found me at home," recalls Viktor Petrovich. "I

immediately began calling the shift supervisor, but was unable to reach him. Then, at my request, the telephone operator made an announcement about the accident and called the personnel of the nuclear power plant to the civil defense headquarters. In those first hours there was much that was not understood and much that was unclear. We had to answer tens of telephone calls. Requests and directives poured forth as if from a horn of plenty. Today it is difficult to recall all the details. I remember only that I was at the plant for three days straight. The situation began to become clear only after a helicopter fly-over of the fourth generating unit. The picture which I saw from the air was shattering. It became clear how useless all the measures which we had been taking actually were. But only the state commission was ultimately able to evaluate the unprecedented scope of the accident."

[Correspondent] What dosage of radiation did you receive in those days?

[Bryukhanov] 250 rem [roentgen-equivalent, man].

[Correspondent] What was your subsequent fate?

[Bryukhanov] There was a trial. I was found guilty and sentenced to 10 years of imprisonment. I spent a year in jail, and several years in a penal colony where I worked as a fitter, repairing thermotechnical equipment. Then I was, as the saying goes among the people, "in chemistry." I performed the duties of dispatcher at a construction administration. At the end of last year I was released ahead of schedule. I recently began working at the "Interenergo" association of the Ukraine Ministry of Power.

[Correspondent] Viktor Petrovich, what do you think, was the accident at the Chernobyl Nuclear Power Plant the result of a fateful coincidence of a series of "incredible," extremely rare circumstances, as certain well-known specialists and the representatives of authoritative scientific institutions have assured us?

[Bryukhanov] The legend of the fateful coincidence of circumstances emerged certainly not by accident. It was necessary for many who held power in order to hide their own guilt. This version also suited very well the USSR Academy of Sciences presidium, and the leadership of the former Minsredmash [Ministry of Medium Machine Building], as well as the entire atomic sector. Yes, there really was a series of successive mishaps at the fourth unit of the Chernobyl Nuclear Power Plant. But that is what the reactor protection system is for, to neutralize them. In our case, however, it did not go into operation.

Yet in general I am deeply convinced that the reason for many accidents at our country's nuclear power plants is not only the shortcomings in design of their outdated reactors, but also our present technological level. Judge for yourselves. The reactors since the Chernobyl catastrophe have been improved, but nevertheless various sorts of occurrences have not ceased.

Recently I had occasion to visit one of the nuclear power plants in Germany. And, you know, I was hurt to tears for our own nuclear power production system. What a huge difference in literally everything! Their territory is better developed, and their equipment is incomparably more reliable. I am not even speaking of automation and safety systems. Yet here is the interesting thing. The personnel there know much less about the physical principles of the reactor's operation or, say, the structural peculiarities of the equipment. When I asked why they were not interested in this, my German colleagues only shrugged their shoulders. Our plant is run by automation, they said.

The director of the German nuclear power plant does not need to worry about how his subordinates will get to work. Most of the workers and employees have their own cars. He does not have to think about special dining facilities. Their most common dining rooms are like our special ones. Nor does he have the headache of medical services, and he can get any equipment he needs. Any material which is in short supply (according to our notions, of course) will be delivered to him in the shortest time. All he has to do is order it. The administration and the plant associates are engaged only in operation, and nothing else.

[Correspondent] Nevertheless, at any nuclear power plant, much depends on the personnel. This is axiomatic. But can only the personnel be blamed for the Chernobyl tragedy, as was done after the accident? Today, when certain formerly confidential circumstances have become known, one cannot help but ask the question: Did they not use you and your comrades as sort of collective "point men?"

[Bryukhanov] I did not admit guilt at the trial. And to this very day I am convinced: You cannot place the blame for everything on the on-line personnel who were working in the fourth generating unit on that terrible night. Each of these people fulfilled his duty to the end, and conducted himself with exceptional courage. For some the accident cost them their lives.

[Correspondent] Nevertheless, the plant personnel violated the rules of operation.

[Bryukhanov] Yes, they were guilty, but unknowingly so. Where, tell me, in what documents, in what regimen cards or instructions is there any mention of even the possibility of such behavior by an RBMK [high-power fuel-channel-type boiling reactor]? Academician Aleksandrov, who headed up the USSR Academy of Sciences in those years, assured us half-jokingly that it could be kept under one's bed.

In our worst nightmares we could not have envisioned what happened with the "super-reliable" apparatus on 26 April 1986. We knew that the most terrible thing was to leave the reactor without cooling. And in all situations we gave primary attention specifically to this. The designers had to see to it that no personnel error could lead to such a tragedy. But, of course, it is easier to

accuse not the developers of the reactor, but the nuclear power plant's collective. And how could we have thrown a shadow over the prestige of Soviet nuclear power production at that time? It was much better to place the plant's director and head engineer on the defendant's bench. But the gist of the matter was that already a few months after the Chernobyl tragedy, they began urgently developing a system of protection for RBMK reactors and taking other measures for increasing their reliability. And in doing so, it was as if they indirectly admitted that such apparatus were technically undeveloped.

Yet our trial went according to a definite scenario and, I believe, the sentence had been pre-arranged in the highest party institutions. At the beginning of the proceedings, I even declined a defense, because I understood that everything had been pre-determined ahead of time. The main guilty party for the accident in any case would be the plant director. And so it was. At that time, in July of 1986, society had not yet matured to the point of honestly and openly admitting that it was the entire system which was at fault.

[Correspondent] Viktor Petrovich, what do you think, if the Chernobyl tragedy had not happened and if an entire series of measures to increase the safety of the RBMK reactors had not been taken, could the recent accident at the nuclear power plant near St. Petersburg have become a second Chernobyl?

[Bryukhanov] I believe it still would not have become one. This was an occurrence of an entirely different scope. Here once again the shortcomings of our technology became apparent, and the structural flaws in the equipment were evident. I might add that exactly the same kind of accident—one on one—happened in 1982 also at the Chernobyl Nuclear Power Plant. Except in that case, only the high-level management knew about that extraordinary occurrence. Not a word about it was said to the population.

[Correspondent] But there were also radioactive emissions at the plant near St. Petersburg...

[Bryukhanov] We also had such emissions into the atmosphere. But the community also never learned anything about them. Any information of that type was at that time considered "secret."

[Correspondent] What technical measures were taken at the Chernobyl Nuclear Power Plant after the accident of 1982?

[Bryukhanov] None. They levelled the accusation that someone manually closed the closure-regulating valve of the operating channel, as a result of which there was a seal failure. As you can see, the same tendency is obvious: It is not the design which is at fault, but a specific worker. In fact, I have no doubt that the valve seat simply broke off.

[Correspondent] Is a repeat of the Chernobyl catastrophe possible today?

[Bryukhanov] I think not. We have all become smarter in the years which have passed. But commonplace, "ordinary" accidents, if we may use this expression, at power stations which have operational RBMK reactors will occur more and more frequently. After all, the equipment is getting old. Therefore, such apparatus should be taken out of operation as soon as possible, without waiting for unpleasant things to happen.

[Correspondent] After all that has happened to you, do you believe in the future of nuclear power production?

[Bryukhanov] Believe it or not, I remain an optimist. Today, when the traditional energy resources—coal, gas, and fuel oil are literally dwindling before our very eyes, nuclear fuel remains rather accessible. Today the Ukrainian nuclear power plants are operating with stability. But I am convinced that in the future our nuclear power plants will become much more reliable, safe, and ecologically pure. Nuclear power plants such as the Chernobyl plant will be merely a distant and painful memory.

Shcherbak Scores Government's Lack of Attention to Ecological Problems

92UN1278A Kiev *SILSKI VISTI* in Ukrainian
21 Apr 92 p 2

[Article by N. Lytvynenko: "The 'Green Wave' Is Subsiding"]

[Text] "I don't understand how these people can continue living here..." An American senator, one of a group of U.S. senators that recently visited Mariupol and other cities in Donetsk oblast, made this unexpected remark, expressing his astonishment over the appalling ecological conditions he saw there. He probably did not know that last year the number of deaths in Ukraine exceeded the number of births by 50,000. This trend is especially marked in ecologically hazardous locations, particularly near industrial giants. But then longevity in the villages is not much higher. The cause is the poisoning of the land, water, and air.

"Unfortunately, there has been no shift towards ecology on a national level," noted Minister of Environmental Protection Yu.M. Shcherbak at a press conference at the ministry. "Just the opposite—the 'green wave' has begun to subside. People are under so much stress because of the problem of prices that they have stopped thinking about the environment.

Unfortunately, our independent state has also not made great strides in its attitude to ecology as compared with the former Union. If emissions of poisonous substances have recently decreased somewhat, this has not been due to increased awareness on the part of managers, but only because the production level is dropping.

"There are enough decrees to build a dam, but nothing has changed," said Yu.M. Shcherbak. "When I started

this job, I was a great optimist. And now I understand that the hardest part is to overcome the inertia of the system."

The Ministry of Environmental Protection did not give permission to the Lysychansk soda plant to dump contaminated wastes into the Siverskyy Donets. The plant did obtain permission—not from the protectors of the environment, but from... the Cabinet of Ministers' committee on extraordinary situations. As could have been expected, following the concentrated discharge of wastes, the water of what was already an extremely polluted stream, which provides drinking water for nearly 600,000 people, worsened drastically. Recently the Supreme Soviet prohibited the closure of industrial enterprises without the approval of the Cabinet of Ministers. Moreover, according to the latest decrees, fines for polluting the environment may not exceed five percent of an enterprise's income... All these measures tie the hands of those in charge of protecting the environment by not allowing them to compel those that contaminate it to compensate in full measure for the damage they cause to the environment. Is it once again a matter of technology first and ecology later? This stereotypical approach on the part of our statesmen is also attested by the fact that the representatives of the Ministry of Environmental Protection were not even invited by the Ministry of Economic Affairs to take part in the discussion of the budget that will be submitted to the session of parliament. By the way, once again they plan to allocate only a paltry sum for ecological measures...

Is it not possible that the 'green wave' is subsiding precisely because it finds no support at the government level?

Ukraine Registers Significant Ozone Depletion

92WN0544B Kiev *VECHERNIY KIYEV* in Russian
5 May 92 p 3

[Interview with Aleksandr Vladimirovich Belyavskiy, senior scientific associate at the Ukrainian Hydrometeorological Research Institute, conducted by Valentin Bludov: "Timely Interview": "We Do Not Have To Throw Out Our Refrigerators To Save the Ozone Layer"]

[Text] *Certain information broadcast on television has alarmed many people. It has been reported that there has been a thinning of the ozone layer over Moscow, St. Petersburg and other regions of the CIS by almost one-half. Maps and diagrams have been produced to support that claim. We have been led to believe that these disruptions of nature will have an adverse effect on human health. Yes, this is in fact a serious problem. That is attested to by the fact that the environmental ministers of the European states will gather this summer to discuss the ozone problem.*

The mass media in Ukraine have not had anything to say on this important subject so far. Could it be that the ozone layer here is perfectly all right? Staff members at the

Ukrainian Ministry of Environmental Protection's Ecological Monitoring Administration advised me to speak with A. V. Belyavskiy, a candidate of sciences and senior scientific associate at the Ukrainian Hydrometeorological Research Institute.

[Bludov] Aleksandr Vladimirovich, first tell us about the ozone layer briefly and in layman's terms. Why has it suddenly begun to concern us?

[Belyavskiy] Ozone is a type of oxygen. In nature ozone forms under the effects of ultraviolet radiation in the upper regions of the atmosphere (from gaseous oxygen). The total amount of ozone in the atmosphere is approximately 3.2 billion metric tons. If all ozone were at sea level and the temperature of the air was 0 degrees Celsius, then it would form a layer a few millimeters thick.

The significance of the ozone layer to every living thing on Earth would be difficult to overstate, because it inhibits destructive ultraviolet radiation and prevents it from reaching the Earth's surface.

Observations of the ozone layer on a global scale have led to the discovery of so-called "ozone holes" in the ozone layer in the polar regions. Now similar phenomena are being observed in various other regions of the planet as well.

One of the main reasons for the appearance of these "holes" or, more precisely, places showing a decrease in overall ozone content over certain areas is man's thoughtless use of the achievements of scientific and technical progress. Take for example chlorofluorocarbons (CFCs). These substances are chemically neutral, and thus a wide range of uses has been found for them in the form of various aerosols, coolants, foaming agents and solvents. But they also actively break down the ozone layer. Now the whole world is replacing them with other, harmless substances; that will require changes in technology and consequently investments of many billions.

[Bludov] The Western mass media are reporting with alarm that the "ozone holes" have begun to appear over densely populated areas. What has been observed in Ukraine?

[Belyavskiy] Systematic ozone monitoring has been conducted in Ukraine since 1973. Analysis of that data indicates that since 1980 the ozone situation has been worsening, and there has been a marked rise in the number of ozone anomalies observed. For instance, in January 1992 stations in Kiev, Borispol and Boguslav recorded a drop in overall ozone content by almost one-half (43 percent). That is the lowest level recorded in the past 20 years. Naturally ultraviolet radiation has increased as well.

[Bludov] What are the effects of these dangerous changes?

[Belyavskiy] I do not wish to overly dramatize the situation. The acuteness of the situation was lessened by the fact that the changes occurred during the winter and that the weather during the period in question was mainly overcast. However, people should be aware that ultraviolet radiation in excess of accustomed levels is harmful.

We have data on a drop in the resistance of human skin and hence of the entire human organism to certain infectious diseases, the frequency of which increases as exposure to ultraviolet radiation increases. In addition to skin diseases there is the possibility of an increase in the number of cases of eye diseases, including cataracts, damage to the retina, corneal tumors and acute photokeratitis. It is particularly dangerous that an anomaly of this nature reduces immunity that has already been weakened by Chernobyl.

Destruction of the ozone layer also has a powerful effect on other biological systems. As a result of increased doses of ultraviolet radiation there occur changes in the traits of plants, their vegetative cycle is disrupted, crop yields decline and the water-use coefficient goes up. The definitive species characteristics of plants change, and the blossoming of some of them is either accelerated or retarded. Research done by foreign specialists indicates that thinning of the ozone layer could also have a detrimental effect on aquatic organisms.

I should note that preserving the ozone layer can also be used as a pretense for various types of speculation. For example, in order to eliminate its competitors the Boeing Corporation pushed through the U.S. Congress draft legislation banning flights by the Concorde supersonic jetliner over U.S. territory (such flights were allegedly disrupting the ozone layer). We should be prepared to face proposals that the technologies of a number of types of chemical industry be changed in connection with credits granted to Ukraine. It is essential that we have a well-developed national ozone monitoring network to verify whether or not such proposals are justified.

We must assess this problem realistically. And face up to the threat. Therefore it was only natural that in 1985 an international agreement was signed, the Vienna Convention on Ozone Layer Protection.

The appearance of "holes" in the ozonosphere has made it necessary to take urgent measures. In September 1987 on the basis of the Vienna Convention 24 states signed the Montreal Protocol on Substances Causing Destruction of the Ozone Layer. These are serious documents. For example, the cost of performing the former Union's obligations under the Montreal Protocol was calculated at R40 billion [rubles] in 1987 prices. I would like to note that Ukraine has signed both of these agreements.

In order to perform the obligations which we have taken upon ourselves we must create an ozone program. Implementation of that program should fall not only to the staff of the Ukrainian State Committee for Hydrometeorology, but also to specialists from the Academy of

Sciences, the Ministry of Health, the Ministry of Environmental Protection and other interested organizations.

Kiev's Waterways Face Threat From Unregulated New Businesses

92WN0523A Kiev GOLOS UKRAINY in Russian
15 Apr 92 p 16

[Article by Nikolay Shchepets, chairman of the Kiev Soviet Permanent Commission on Environmental Protection and Ecology; Mikhail Kuzmenko, head of the fresh water radioecology section, Ukrainian Academy of Sciences Hydrobiology Institute, and doctor of biological sciences; and Vladimir Yakushin, head of the microbiology laboratory, Ukrainian Academy of Sciences Hydrobiology Institute, and candidate in biological sciences: "The Water Reservoirs in the Big City Are Perishing"]

[Text] There are over 300 small rivers and lakes in Kiev. And their fate requires particular attention. Due to the uncontrolled anthropogenic effect, not only are the internal processes in the water reservoirs deteriorating, but their overall appearance is becoming terribly distorted. The water is losing its biological value, and sometimes even becoming toxic.

The ever-present Chernobyl radionuclides have not bypassed the city water reservoirs. Although their content in the water is relatively low, in the bottom sand and suspended particles it is already thousands, and perhaps even hundreds of thousands of times greater.

Kiev's small rivers are suffering from pollution by sewer waters, oil residue, fertilizers, industrial and household waste. Some of them have been desiccated along a significant portion of their channel, some have been constrained by concrete banks, or even hidden underground. The Lybed, Syrets, Kurinyy Brod, Buslovka, Klov, Darnitsa, Vita, Pochayna, and Kiyana Rivers have been disfigured by concrete banks, and with their murky water are more reminiscent of sewers...

As an example, we may cite the ecological situation which has arisen around the Nivka River—the right tributary of the Irpen. It is only two meters wide and 19 kilometers long. However, it is constantly being filled with surface runoff, inadequately purified sewer water from nine collectors, and drainage from livestock raising complexes and agricultural farm lands treated with toxic chemicals. There are around 60 enterprises located in the Nivka basin within the limits of Kiev. Most of these enterprises are ecologically hazardous. Only 16 of the enterprises have operating purification structures. Therefore, it is not surprising that instead of fish, low life forms of algae organisms and higher water plants are intensively multiplying in the river. This leads to secondary biological pollution.

The ecological condition of ponds and lakes is no better. This is confirmed also by the studies conducted by the

Ukrainian Academy of Sciences Hydrobiology Institute. A rather high content of organic substances has been detected in the water of the Korchevatskiy ponds. In the summer there is a deep shortage of oxygen, and the number of E. coli bacilli in the summer-fall period reaches 2,800 cells per liter. By sanitary indicators, the water in the Korchevatskiy ponds is considered "very dirty."

The string of water reservoirs along Obolon-Minskoye, Lugovoye, Ptashinoe, Bogatyrskoye and Opichen (evidently they are located along the channel of the historical Pochayna River) is, in essence, a collector which gets the surface run-off from an area of around 6,000 hectares, as well as the drainage from industrial enterprises. These lakes, except perhaps for Ptashinoe, cannot be used for recreational and fish management purposes unless their sanitation conditions are improved. In Lake Opichen, which is the most polluted, the water is characterized as "slightly" polluted.

The purest along the Obolon is considered to be Lake Verbnoye, whose water is relegated to the gradation of "rather pure." In order to save the lake, the local soviet proposed making it a natural monument and granting it the status of a recreational zone. The Kiev City Council is already preparing a resolution on this question.

But will the deputys' decisions save the reservoirs? In 1989 the Kiev City Council adopted a resolution on preventing pollution of the Nivka River. Specifically, the construction of water-protection facilities at polluting enterprises was envisioned. A number of design developments were presented by specialists from the "Kievproyekt" Main Administration. However, today it is becoming ever more difficult to realize them, as well as all other resolutions. And the gorispolkom [city executive committee] capital construction administration is dragging its feet on introduction of purification structures at all city drainage collectors. The task of saving the river is becoming quite problematic...

Under conditions of a transition to the market, the resolution of ecological problems is being restrained, and in some places put off indefinitely. Moreover, the negative environmental effect of newly created small enterprises and cooperatives is increasing. There are already cases when the irresponsible attitude of entrepreneurs toward legislative environmental protection requirements have led to serious consequences. For example, petroleum products have polluted Lake Tsentrallye due to the negligence of the "Podvodnik" cooperative...

Under conditions of an extremely complex ecological state of the water reservoirs and in the face of an indefinite ecological situation, when the legal system has not yet been consolidated, there is a pressing need to conduct in-depth studies of water reservoirs, to determine their status, to develop ecological passports and to present recommendations aimed at their sanitary-ecological revitalization.

This, we might add, will influence not only the revitalization of the natural environment, but also the realization of Kiev's social programs.

CAUCASUS/CENTRAL ASIA

Azerbaijan 'Greens' Hold Founding Congress

92WN0531A Baku BAKINSKIY RABOCHIY
in Russian 28 Mar 92 p 3

[Unsigned report: "The Founding Congress of the 'Greens' Society"]

[Text] The environmental protection movement in Azerbaijan, which is choking from a multitude of ecological problems, has followers among all strata of the republic's population and has been active for several years now. In this time it has carried out a number of useful actions and carried through more than one initiative; but until now the movement was not formally organized. On 27 March the founding congress of the "Greens" Society of Azerbaijan was held in the building of the republic Academy of Sciences.

Speaking before the opening of the congress, Sheikh-ul-Islam Hadzhi Allakhshukiyur Pasha-zade, chairman of the Administration of Caucasian Muslims, blessed its work and presented a Koran for the society.

Peoples deputies of Azerbaijan Isa Gambarov, Sabir Rustamkhanly, and Nadzhaf Nadzhafov also spoke and welcomed the delegates to the congress.

After a brief discussion the congress, by majority vote, adopted a program and charter for the society and elected its executive organs.

By an open vote Arif Mansurov, chairman of the republic State Committee for Environmental Protection, was elected chairman of the Azerbaijan "Greens" Society.

The delegates also adopted an appeal to the Azeri people.

Measures Passed To Improve Conditions of Aral Sea Residents

LD0805170992 Alma-Ata Radio Alma-Ata World
Service in English 2030 GMT 7 May 92

[Text] The Cabinet of Ministers of Kazakhstan has passed a resolution recently on urgent measures of improvement of social, economic and ecological conditions of people who live in the Aral Sea area. Their resolution says that the consequences of the ecological crisis in that region caused negative influence upon the living conditions of people of the Aral Sea region. Despite the measures on normalization of social economic situations in the region which were taken before, a radical improvement of living conditions was not reached. In this connection the cabinet of ministers of the republic passed the resolution directed for the realization of concrete measures to improve the situation the Aral Sea area.

Nuclear Research Center To Be Created in Semipalatinsk

LD1505205792 Moscow ITAR-TASS in English
1608 GMT 15 May 92

[By KAZTAG correspondent Gennadiy Kulagin for TASS]

[Text] Alma Ata, May 15 (TASS)—Kazakhstan President Nursultan Nazarbayev signed a decree on Friday to reorganise the nuclear range in Semipalatinsk and several other nuclear facilities into a republican nuclear research centre and an atomic energy agency.

The centre will study ecological and radiation safety of nuclear facilities, utilisation of radioactive wastes and conduct other research.

The atomic energy agency will have the right to make decisions in nuclear engineering, which will be obligatory for all atomic power ministries, departments and enterprises.

REGIONAL AFFAIRS

European Industry Responds to Proposed Recycling Legislation

92WS0444Q *Toddington NEW MATERIALS INTERNATIONAL in English Feb 92 pp 6-7*

[Article: "Legislation for Recycling Steps Nearer"]

[Text] Legislation is creeping onto the statute books to force manufacturers of vehicles to be more responsible for the total life-cycle cost of their products.

Switzerland, for example, is proposing legislation to impose an additional new car tax to pay for three incinerators for the disposal of light fraction materials, the first one to be operational in 1996. The light fraction has an energy content similar to wood and the use of incinerators to dispose of the light fraction and reclaim the energy is very attractive.

According to Derek Gentle, manager advanced technology, Ford of Europe, a major disadvantage of the Swiss proposal is that the tax would be the same for all cars, to the benefit of large, heavy, high energy use vehicles. Unfortunately incinerators, which would have to ensure efficient removal of toxic gases, are presently not generally available, are expensive, and require very time consuming licensing procedures (at least 10 years in Germany).

Also, Holland is considering implementation of a tax or charge on new cars to pay for disposal and Britain is also considering legislation to address the issue.

Gentle said that Germany presently has the most publicised ambitions for vehicle disposal legislation. The federal minister for the environment is proposing to introduce legislation to force automotive companies to take back old cars and to recycle some proportion of the light fraction materials. At least for new cars, this take-back would be at no cost to the final owner.

Proposals

The six German car companies, VW, Opel, Ford of Germany, BMW, Mercedes and Porsche, have responded by setting up an industry sub-group, commonly called the PRAVDA group, within the German vehicle manufacturers association (VDA). This group has made counter proposals to the government.

The aims of the PRAVDA concept are that manufacturers or their agents will take back old vehicles from last owner; it would use existing disposal systems; disposers would meet legal requirements; vehicle manufacturers individually would select and authorise disposers to form countrywide network; authorised disposers would give a certificate of disposal releasing the last owners from tax liability; and finally, the disposer and the last owner should negotiate value of scrap vehicle.

The European Commission is also planning to introduce legislation for vehicle disposal, ACEA (The Association of European Automotive Manufacturers comprising BMW, DAF, Daimler-Benz, Fiat, Ford of Europe, GM Europe, MAN, Porsche, Renault, Rolls Royce, Rover Group, Saab Scania, VW, AB Volvo) has made proposals similar to the PRAVDA group. ACEA states that the appropriate supplying industries should share responsibility for the processing or recycling of their products, that the disposer network should be flexible and Europe-wide, and the national authorities should promote the operation of processing facilities.

One aspect of all these proposals is that the last owner would be forced to dispose of his car through a licensed disposer in order to avoid uncontrolled dumping.

'Market forces would encourage the manufacturer to make his car as recycling friendly as possible, and material recycling would be used to reduce the level of light fraction to be disposed of by energy recovery, or by landfill as last resort,' said Gentle.

In the U.S., many landfill sites are due to be closed because of new Environmental Protection Agency (EPA) legislation and pressures are building on vehicle disposal. General Motors, Ford and Chrysler have already formed a consortium to work on recycling and car disposal.

Suppliers

Supplier involvement in material recycling and design for recycling is a major part of the German, European, and U.S. proposals. In Germany, suppliers have organised themselves into groups to handle specific materials such as nylon and SMC, and in a few cases these groups have become new joint ownership companies.

'There is a risk that if British suppliers are not involved in these recycling efforts they will be at a disadvantage, because recycling and car disposal legislation is not a passing fashion and it will not go away,' warned Gentle.

In the UK, a new vehicle disposal steering group with membership presently from Ford, Rover, Vauxhall, Nissan, Jaguar and BMW (UK), with two advisory members from the disposer/shredder industry, has recently been established to ensure that the UK motor industry plays an active role in influencing legislation on recycling and other car disposal issues. This group operates under the umbrella of the SMMT and will direct SMMT recycling efforts.

A typical Ford vehicle contains a light fraction of 21 percent, bolstered by 48 percent steel, 17 percent iron castings and forgings, 4 percent aluminium, 6 percent fluids and 4 percent electric motors and wiring.

The largest elements of the light fraction are: rubbers, 26 percent; thermoplastics, 25 percent; glass, 14 percent; felt, 10 percent; paint, 9 percent and form, 7 percent.

Ford has set up a pilot dismantling facility in the Cologne plant in the same building where it pilots the assembly of new vehicles.

'This facility allows the investigation of disassembly processes for both old, current, and new models, so that we can advise the disposer industry and prepare dismantling manuals, while helping the design of new products for easier recycling,' noted Gentle.

The Ford recycling programme is handled through a European Recycling Coordination Team with membership split between Ford of Britain and Ford of Germany. Much of the basic work required to establish a recycling system is carried out in Ford's British engineering facilities or funded in British universities.

'One of the first things we discovered from our dismantling studies was how good the Escort range is for dismantling,' said Gentle, 'Although it was not specifically designed for disassembly we find that one man can remove most of the large plastics items in less than 20 minutes.'

'Recent changes to the Escort eliminating mixtures of plastics in the modular instrument panel facia make this easy to disassemble,' he added. 'It would also appear from work being carried out with ICI that the moulded in cover seat pads can possibly be chemically recycled without separation of the cover from the foam, and that work with equipment suppliers is providing satisfactory mechanical separation of form from plastics in the bumpers. The bumper work is an extension to the successful recycling work on our polycarbonate alloy bumpers carried out with GEP.'

Costs

Gentle said the costs of collecting and recycling plastics have not yet been established and must be a major part of the recycling effort, but extrapolating available data indicates that some of the lower cost plastics, although highly publicised as being recyclable, may not be worth recovering unless collection costs can be minimised.

But why not drop plastics and revert back to steel? 'More than 80 percent of the total energy used during a car's lifetime is in fuel. Reduction in plastics use would increase the total lifetime energy, and hence deplete world resources faster, as well as increasing carbon dioxide output,' said Gentle.

EC Long-Term Environment Plan Outlined

92BR0266A Groot-Bijgaarden DE STANDAARD
in Dutch 11 Mar 92 p 1

[Article by Antoon Wouters: "EC Commission Revises Environmental Policy and Rejects Idea of New Nuclear Power Stations"]

[Text] Brussels—During the next few months, the EC Commission will put finishing touches on a completely revised version of its environmental policy with a view

to achieving "sustained development" in the EC by the end of the century. Sustained development means that present generations meet their own needs without jeopardizing the development of future generations. The Commission therefore rejects the implementation of new nuclear power stations, turning instead toward renewable sources of energy for the production of electricity.

The draft paper, entitled "Towards Sustainability," to which our editorial staff had access, provides another prozaic definition of sustained development: "Do not eat today the seeds of tomorrow's harvest."

Challenge

The 1980s was an era marked by the establishment of the single market. The challenge for the 1990s will be the achievement of sustained development. According to the EC Commission, durable economic growth can only be achieved if the environment is not regarded as an obstacle, but as a vehicle toward efficiency and competitiveness.

A major change in the revised policy is the fact that pollution and environmental damage will no longer be allowed to occur, but that action will be taken upstream from products and activities in order to prevent pollution.

It is absolutely out of the question that new nuclear power stations will be built in order to generate the 11 billion watts of electric power needed. The emphasis will lie on renewable sources of energy.

At the environmental summit in Dublin (June 1990), the EC ministers of the environment adopted the principles of sustained development and prevention. The Fifth Environmental Action Program is designed to achieve that goal by the year 2000.

Between 1992 and 1995, the EC Commission will reorganize EC policy in that sense, and between 1996 and 2000, it should be fully in effect.

Main Goals

The new environmental policy must be implemented in a period of major changes: the single market, the development toward economic and monetary union, the pursuit of political union, the political and economic changes in Central and Eastern Europe, and policy revisions in the fields of structural funds, agriculture, transportation, and energy.

The EC Commission intends to establish a framework of cooperation with industry, because industry does not only play a role in causing environment problems, but also in solving them.

The main goals include the integrated monitoring of pollution through licenses, inventorying emissions, making environmental audits, levying environmental

taxes, and implementing the cleanest possible technologies. Through economic and fiscal measures, a system of deposits, and strict dumping regulations, waste piles could be reduced. The manufacture of environmentally safe products is stimulated through the introduction of the "Eco-label," product standards, increasing consumer awareness, and tax benefits.

The energy sector is a cornerstone in the sustained development policy, and requires a strategy reaching far beyond the year 2000. In the short and medium terms, the commission will focus on energy saving and on the development of technologies to reduce carbon emissions.

Through economic and fiscal incentives, the emission of CO₂, SO₂ and NO_x will be restricted. Alternative and renewable sources of energy—such as biomass, wind, tidal, solar, hydrothermal, and geothermal energy—will be encouraged.

In the field of transportation, EC Commissioner Van Miert published a "Green Paper for Sustained Mobility" last month. In this field, the EC aims at cleaner cars and fuels, EC control on the number of cars, the reduction of fuel evaporation, and a better infrastructure. Awareness campaigns and economic and tax measures are expected to urge citizens to adopt a different driving and traveling attitude.

Balance

The present common agricultural policy is conducive to overdevelopment and to the pollution of agriculture's natural resources, in other words to soil, water, and air pollution. In addition, there is the problem of agricultural surpluses as well as sociological problems due to the depopulation of rural areas.

The balance can be restored by returning to extensive and organic farming, by reducing the use of pesticides, by implementing development programs for rural areas, and by reforestation and long-term afforestation.

Finally, the EC points out that the tourist sector is causing more and more environmental problems and that a policy of sustained tourism is urgently required if tourists are not to be swamped by their own dirt.

EC To Ban CFCs by 1 Jan '96

92MI0421A Bonn DAS PARLAMENT in German
27 Mar 92 p 1

[Text] The European Community will totally cease production and consumption of chlorofluorocarbons (CFC's) by 1 January 1996, according to an agreement of principle adopted by EC Environment Ministers in Brussels on 23 March. The EC will thus discontinue production of CFCs, which damage the ozone layer, two years earlier than hitherto planned. CFC production is to be reduced by 85 percent by 1 January 1994. Federal Environment Minister Klaus Toepfer failed to secure agreement in Brussels to his proposal to ban CFCs from the beginning of 1995. Recent reports on the rapid

depletion of the ozone layer over the northern hemisphere have alarmed the EC; scientists estimate that it only takes a 10 percent reduction in the ozone layer to cause up to 1.75 million new cases of the dreaded eye disease, cataract, and around 300,000 additional cases of skin cancer.

DENMARK

Environment-Friendly Businesses Promoted

92WN0475A Copenhagen BERLINGSKE TIDENDE
SONDAG in Danish 19 Apr 92 Sec I p 12

[Article by Connie Hedegaard: "Economic Carrot Can Ensure Big Environmental Gains"]

[Text] The environment minister is urging businesses to examine all their production processes closely with a view to conserving resources and small and medium-size firms will be offered consultant assistance with the task.

On the basis of the good experiences of such firms as Danfoss, the slaughterhouses and Faaborg Dyeworks, Environment Minister Per Stig Moller (Conservative) is urging business firms to examine their production processes with possible environmental gains in mind.

"After the slaughterhouses made a thorough examination of their production process, for example, they cut waste water by 80 percent and in the space of a few months Faaborg Dyeworks saved enough to pay for the investment in a new and more environmentally compatible production method," said the minister who has no doubt that firms that follow environmentally correct practices can also reap big economic profits. As a possible incentive for employees the minister mentioned environmental pay.

"Of course businesses must decide for themselves how they will tackle the job but I would recommend that they use money as a carrot in relation to their workers who must be involved in the process anyway if results are to be achieved," the minister said.

Moller conceded that it can be difficult for smaller businesses to set aside enough resources for a thorough review of production.

"Therefore the Environmental Administration has set up a consultant program where small and medium-size firms can seek advice about the best place to start," Moller told BERLINGSKE TIDENDE.

LO [Federation of Trade Unions] deputy chairman Hans Jensen reacted positively yesterday to the idea of so-called environmental pay while the director of the Danish Employers Association, Jens Andersen, said that his organization has not taken a stand on the matter. "But if any of those who are drawing up contracts want to include this demand, we will have to look at it then," he said.

Both Danfoss and Workers Benefit

Danfoss personnel have no reservations about recommending that other companies go along with the ideas of Environment Minister Moller and Industrial Affairs Minister Anne Birgitte Lundholt (both Conservatives) concerning so-called environmental pay.

After two years on a merit pay system where the environment was included as one of several parameters for determining wages, the results in the Danfoss surface treatment division are evident:

The division's water consumption has been cut in half, the discharge of waste water in the year when chemical consumption was one of the parameters has fallen by around 10 percent so far and in the better of the two years that the system has now been in effect each worker received about 5,000 kroner in extra wages as a direct result of the merit pay system.

Thousands on Merit Pay

All of the approximately 5,000 workers receiving hourly wages at Danfoss are on so-called merit pay, but so far it is only in the surface treatment division with 35 workers that environmental factors have acted as independent parameters.

The division is an especially large user of chemicals as well as water, which is a scarce resource in Nord-Als, making this an obvious place to set reduced water and chemical consumption as goals for merit pay, according to factory chief Egon Hansen.

10 Percent of Total Pay

The merit pay represents just under 10 percent of a worker's total paycheck—assuming that the goals are met. If not there is a corresponding reduction in merit pay. In contrast to the personal qualification bonuses that are also part of the Danfoss pay system, merit pay is based on group performance. In other words it is the results achieved by the division as a whole that count—and individual workers get equal amounts when the results are added up.

"We simply placed a water meter at each work station so we can quickly see if there are problems with a machine or if someone has forgotten to turn off a faucet on the weekend, for example, and due to the shared pay there is a clear mutual interest in quickly correcting a problem," said Hansen.

The merit pay objectives of an individual division are agreed on for a year at a time and the parameters change from year to year as the goals are met, among other things.

With the help of the curves posted on the division's bulletin board workers can keep track of how targets are being met at all times and experience shows that they have a great deal of interest in merit pay.

Because the workers, the company and the environment all benefit from the increased environmental awareness, Danfoss plans to expand the use of environmental parameters in the future.

Environmental Minister on Impact of Maastricht

92EN0511B Copenhagen INFORMATION in Danish
22 Apr 92 p 3

[Guest commentary by Environmental Minister Per Stig Moller: "EC Moving Toward 'Danish' Environment"]

[Text] Is the union treaty green enough and are its provisions adequate when it comes to correcting environmental conditions in Europe?

There seems to be disagreement over whether the EC treaty's new environmental principles represent an improvement over the current treaty. By and large the treaty's environmental provisions meet all the wishes included in the Folketing memorandum of October 1990.

Everyone seems able to go along with the following: It is a step forward that majority decisions can now be made in the environmental area. It is a step forward that the goal of a sustainable environment is now included in the treaty's stated objectives. It is a step forward that the treaty now says that environmental considerations must be an integral part of the European Community's policy in the areas of industry, agriculture, transportation, etc. and it is a step forward that the EC now also has an opportunity to assume some responsibility for global environmental problems.

In consequence it is natural that the criticism of the union treaty is fairly diffuse. By and large, concrete criticism of the treaty is limited to criticism of the fact that during the final discussions in Maastricht three exceptions to the principle of majority decisions on environmental matters were inserted. The opponents claim that these three exceptions, which involve fiscal environmental control fees, the physical planning and administration of water resources and steps that largely concern the countries' energy policies, actually make the new principle of majority decisions an illusion. But this concern is unfounded. The greater part of the environmental area—limits on air, soil and water pollution, nature preserves, species protection measures, etc.—are still covered by the principal rule on majority decisions. In all these areas it will no longer be possible for some "environmentally backward" countries to block the adoption of new environmental regulations.

Moreover the criticism seems curious, because we ourselves have just displayed some reluctance to give the EC too much influence in the areas of taxation and physical planning. Thus we should be able to mobilize some sympathy for the fact that other countries also have the same kind of reservations. And even though the optimum negotiating result would have been a majority rule with no exceptions, there is no reason to refuse to

settle for second best. Would we be entirely pleased if our regional plans had to be enacted or approved in Brussels? Would the opponents of the treaty be entirely pleased if Brussels ordered us to use nuclear power to supply our energy needs?

In addition the skeptics usually question whether the changes in the treaty are adequate when it comes to counteracting the increased strain on the environment in the internal market and generally correcting the unsatisfactory state of the environment in Europe.

This question is relevant. It is just asked in the wrong context. It is not and cannot be the task of a treaty like the EC treaty to establish policies. The treaty's main task is to establish a framework with regard to which institutions can make decisions on what and in which way. It is a tool and should be judged as such. And as I said, no one doubts that the Maastricht treaty is a better tool in the environmental area than the treaty we have today. This has recently been confirmed by the green organizations.

As we move toward the popular referendum on a closer affiliation with the European Community it is natural to discuss what we can expect from the EC's future environmental policy.

This question was answered to a very large extent on 18 March of this year when the EC Commission adopted a new action program for the EC's efforts in the environmental area up to the end of the century. The action program, which is entitled *Towards Sustainability*, is the fifth in a series of environmental programs that have so far provided the basis for a good 200 EC environmental directives. The new action program differs significantly from the earlier programs in not only referring to selected environmental initiatives but actually presenting an overall strategy for an integrated environmental effort that includes all the EC policy areas.

The adoption of the fifth environmental action program will represent something of a revolution in EC environmental policy. Against the background of a comprehensive report on the state of the environment in Europe, the commission refers to the necessity for a major change in course with regard to the community's environmental policy. On two points in particular this involves an entirely new concept in relation to the environmental directives the EC has been able to issue up to now.

First and foremost the environmental action program stresses that in the future the environment can no longer be regarded as a special area that is dealt with primarily by the commission's Environmental Directorate. If we are to have growth in Europe and at the same time correct the state of the environment, environmental considerations must be an integral part of all other EC policy areas. When officials in the commission's Internal Market Directorate draw up proposals for new harmonization regulations, for example, it should be as natural to include environmental concerns in their discussions as economic considerations. In this way the fifth action program will be the "embodiment" of the Maastricht

treaty's new statement of purpose on sustainable growth and the obligatory integration of environmental considerations in sector policies. A provision that was included as the result of Danish initiative.

The environmental action program designates five sectors which have been placed at the top of the environmental integration agenda because they pose the biggest environmental threat. They are industry, energy, traffic, agriculture and tourism.

This integration closely corresponds to what the Danish Government decided when we appointed our ministerial supervisory and initiative group in January. In the industrial area the introduction of the cradle-to-grave concept constitutes the pivotal factor. Companies' production processes must be environmentally evaluated from start to finish to minimize the consumption of raw materials and energy, the discharge of pollutants and the creation of waste material. The commission has just approved a proposed directive on an environmental review of companies that is expected to be presented to the Council of Ministers in the fall. In addition the action program cites the need for environmentally determined production standards that are established on the basis of cradle-to-grave assessments.

Energy efficiency is the heading of the action program's strategy for the energy sector. Efficiency standards for products, machinery and vehicles, standards for building insulation and the use of economic control mechanisms are the means. In the traffic area the action program puts special emphasis on improvements in automobile engine and exhaust technology and the development of purer types of fuel. In this area a further tightening of exhaust emission norms for passenger cars in the direction of the "California norms" will be one of the first main goals.

According to the action program European agriculture can expect the already approved nitrate directive to be followed up with stricter norms for nitrate and phosphorus runoff and a requirement for reducing the use of sprays. In addition the commission will strive to have 15 percent of agricultural land set aside as nature preserve areas based on management agreements with the farmers. In continuation of this a special effort will be made to promote the planting of forests in Europe through such things as better subsidy arrangements of the kind we have in this country.

When it comes to alleviating stress on the environment as a result of the expanding European tourist industry the commission will work for the establishment of new standards for bathing and drinking water as well as the creation of "buffer zones" around sensitive areas, including special protection of coastal and mountain areas. To this end the commission is already drawing up a coastal protection directive, again similar to what we have just done.

The other point on which the new environmental action program charts a decidedly new course for the EC's

environmental policy involves administrative mechanisms. With the action program the commission has joined the growing international realization that a one-sided emphasis on regulation deprives one of utilizing the big possibilities that lie in other means of influencing behavior. First and foremost market forces can be a formidable tool for inducing companies and consumers to act in a more environmentally correct way. The action plan stresses the point that including the external environmental costs in the price of goods insures that environmentally friendly products will be competitive. At the same time it will motivate producers to lower their external environmental costs by cutting the amount of waste, the discharge of waste water, etc.

In addition to market-based instruments the action program points to financial subsidy systems and agreements with industry and agriculture. The agreement concept was not included in the first draft of the program but was inserted on Denmark's initiative in light of the good Danish experiences with environmental agreements.

All in all the fifth environmental action program bears clear signs of being inspired by the environmental policies pursued in the greenest member countries in the EC, including Denmark. As the commission is the body that submits proposals for EC directives and thus acts as the dynamo of EC activity, it is especially important that it has decided to make the high environmental protection level in the environmentally aware countries the common denominator for the collective European environmental effort.

The EC has started the ball rolling in the direction of a stronger effort for a greener Europe. Now it is up to the member nations to insure that the action program is carried out. One should harbor no illusions that this will be an easy task. But with the Maastricht treaty in hand we will have an effective tool that puts Denmark and the other environmentally friendly member countries in a stronger position at the conference table in Brussels. That is one of the reasons why it is so important to vote yes on 2 June.

If we vote no because the Maastricht agreement could have been better, even though it is fairly good, we are really voting for something worse. And that would be detrimental for the environment. It is as true in Europe as it is in Denmark that environmental problems cut across national boundaries.

Steel Mill First in World To Sign Binding Environmental Charter

92WN0511A Copenhagen BERLINGSKE TIDENDE in Danish 7 May 92 Sec 3 p 4

[Article by Sejr Clausen: "Environmental Move by Danish Steel Mill"]

[Text] **Danske Stalvalsevaerk in Frederiksvaerk was the first steel plant in the world to sign a binding international environmental charter yesterday.**

Danske Stalvalsevaerk is giving the environment a high priority in a modernization plan that will cost over 1 billion kroner over the next five years. Yesterday the firm's manager and chairman of the board, director Reidar Klausen, signed the International Chamber of Commerce's environmental charter.

"This is a significant example of how seriously the Danish industrial sector views environmental considerations," said Danish Industry director Hans Skov Christensen.

Danske Stalvalsevaerk is the first steel producer in the world to pledge to meet the charter's requirements.

The charter was drawn up as the international business community's proposal for the global environmental conference in Rio de Janeiro later this year.

Danfoss, Grundfos, Novo Nordisk, B&O, DONG and ABB have made similar commitments.

In conjunction with its "green balance sheet" the company will now underline its active environmental effort with new goals for recycling by-products, among other things.

The plant's 1,300 workers turn 700,000 tonnes of scrap into 600,000 tonnes of new steel each year. The recycling rate is currently over 80 percent, but the goal is to increase this figure to around 95 percent.

Last year the steel plant spent 100 million kroner on environmental projects.

FINLAND

Bill Would Restrict Clear-Cutting

92WN0495A Helsinki HELSINGIN SANOMAT in Finnish 7 Apr 92 p 9

[Article by Johanna Mannila: "Bill Dealing With Clear-Cutting and Cellulose Plants To Go to Eduskunta This Fall; Attempts Will Be Made To Prevent Damage to Environment by Evaluating Consequences in Advance"]

[Text] What do freeways, fertilizer plants, the clear-cutting of 200 hectares, artificial lakes, power lines, cellulose plants, and natural gas pipelines have in common? Nothing yet, but in as early as a couple of years from now an environmental impact evaluation, or YVA, will be required for all of them. In accordance with it, the consequences of any major project that will alter the environment will be weighed first and only after that implemented. The procedure may apply to smaller projects too, but to do so a separate decision will have to be made by the provincial government.

Public Hearings for Citizens Too

If everything goes as Environment Minister Sirpa Pietikainen (Conservative) hopes it will, the Eduskunta will get to debate the YVA bill this fall. The bill will be drafted by May, after which it will be circulated for comment this summer.

The YVA is part of a decisionmaking process. It would, for example, guarantee that all of the effects a cellulose plant would have on the natural environment are considered before the decision to build it is made. With the YVA, it should be impossible to build a dump on top of a groundwater basin.

"The YVA will be a law that affects every citizen. A person's activities will have to be compatible with the natural environment's ability to tolerate them. The new permit procedure will not mean doubling the work load nor will using common sense be prohibited in future either," Pietikainen described the bill. "The law will be one of the most important laws of the decade."

With the YVA procedure, reporting on projects will improve and, in addition to making reports, officials who handle business permit applications will have to listen to citizens' opinions at special information sessions and public hearings.

Anyone who wants information on a project will be directed to separately appointed persons responsible for handling it. As a prerequisite for sincerity and the opportunity for people to participate in the process, there will be summaries that are intelligible to everyone which will clarify the main points from the standpoint of arriving at a decision.

The drafters of the bill believe that the law will render the already existing public accounting and hearing procedures uniform.

"Number of Disputes Will Be Reduced"

Overlapping procedures will be reduced, that is, the intention is to condense the procedures for building permits, operating permits and variances, environment permits, water-right permits, removal permits in conformity with soil permits, decisions in principle that are in compliance with the nuclear energy law, and for validating road plans in compliance with the law governing public roads into the YVA procedure.

"There's no need to fear an enormous number of concerned parties or litigants and an avalanche of complaints. At the present time people only hear about projects when the foundation stone is being laid. The proceedings of the existing hearings do not reach people. It's no wonder that opposition is generated and that complaints are filed at the highest levels of the justice system. The number of disputes concerning the environment will certainly be reduced if plans can be changed and improved as early as during the preliminary phase."

According to Pietikainen, the specification of who the interested parties are will be more narrowly defined during the circulation of the bill for comment this summer. "I would think that as concerns a freeway project, for example, Greenpeace would be rejected and the local Nature Conservation Association organization would be accepted. Local residents would, of course, be heard."

Where can the YVA get deadlocked? "I think that the YVA is a good and reasonable general principle. It's hard to imagine who would oppose it. There's no need to fear that [it will result in] more bureaucracy and expenditures."

"When drafting the wording of the law, what kinds of interpretations of it are made may crop up as a problem—and mistakes will certainly be made. Fear of mistakes must not be allowed to prevent reform. We've now seen that mistakes have been made in firms' calculations of their expenses...."

In Pietikainen's opinion, once the YVA is implemented, environmental rights must be written into the Constitution. "As things stand now, if you destroy the forest, you're threatened with a trip to prison. You're not allowed to light a bonfire near your neighbor's property line. On the other hand, you can do whatever you want to the land and the waters."

In Pietikainen's opinion, Finland's natural environment is in relatively good condition. Only the Baltic is in bad shape. "Of course, it depends on our basis of comparison. Compared with the days of Lievestuoreen Liisa, for example, the forest industry has reduced its discharges, but the situation looks bad when we look at the enormous number of tons [of waste] flowing into our waters and the natural environment's ability to tolerate them."

FRANCE

Government Establishes Environmental Protection Program

92WS0435D Paris LE MONDE in French
12 Mar 92 p 12

[Article entitled: "Mrs. Cresson Establishes a New Environmental Program"]

[Text] The cabinet members who met on Wednesday, 11 March focused essentially on issues of environmental protection.

The environmental minister, Brice Lalonde reported on his work, stressing from the outset that government authorities had increased their resources substantially. State and government agency expenditures on environmental protection rose to 12 billion French francs [Fr], and over Fr5 billion worth of tax concessions were granted.

Mr. Lalonde observed that a better environmental balance now existed and that the state's partners had been "mobilized." The minister also announced that a bill on regional nature parks was being drafted and that a task force would make proposals on the establishment of a "nature police" between now and 30 June.

Prime Minister Edith Cresson established a new government environmental protection program. It will involve: "Assuming the leadership of the international movement to protect the environment; guaranteeing the right of French people to a quality living environment (...); investing in the environment within the framework of our employment and industrial policies and our reform of agricultural policy; involving citizens in environmental issues by strengthening procedures to consult the public and adding the subject to school and university programs."

As reported by government spokesman Jack Lang, the prime minister stressed that the accomplishments of Mr. Lalonde and the new environmental program "were all the more impressive as France is already one of the best conserved countries in Europe." Mrs. Cresson added that public investment in environmental protection will total about Fr100 billion in the coming years, and emphasized that "the environment must be a basic element in all the policies of every ministry."

The president of the republic described all these developments as "very positive." He pointed out that "trees do not vote or protest" and encouraged the government to protect them. He urged it to continue its environmental work "with determination, enthusiasm, and courage, to resist all kinds of political conservatism."

Moreover, the council of ministers adopted three bills. The primary aim of the first is to modify the legal status of real-estate investment partnerships authorized to act as public savings banks; the second would approve the status of international study groups on copper, tin, and nickel. The third pertains to maternal assistants, and would involve changes in the Family and Social Assistance Codes, the Public Health Code, and the Labor Code (see page 10).

The economic and finance minister presented a decree authorizing the minting of a new Fr20 two-color coin that will picture Mont-Saint-Michel and be issued next fall.

Industry Leaders Form Environment Association

92WS0447B Paris AFP SCIENCES in French
19 Mar 92 pp 40, 41

[Unattributed article: "Creation of the 'Business for the Environment' Association"]

[Text] Paris—Fourteen large industrial groups have just created Business for the Environment, a French association designed to promote their joint efforts for the environment, and also to defend their point of view; the

creation was announced on 17 March by the president of the Association, Mr. Jean-Rene Fourtou, Rhone-Poulenc chief executive officer.

The Association, created within only six weeks, includes—in addition to Rhone-Poulenc—Air Liquide, Generale des Eaux, Elf-Aquitaine, EDF [French Electricity Company], EMC [Mining and Chemical Company], Hydro-Azote, Lafarge-Coppe, Lyonnaise des Eaux-Dumez, Pechiney, Renault, Total, Usinor-Sacilor, and the Belgian company Solvay.

It has a starting budget of 17 million francs [Fr], voluntarily contributed by the founders, and it may receive specific contributions to implement its programs. In particular, the budget will be spent on eliminating "orphan blackspots," in other words abandoned industrial-waste sites, Mr. Fourtou indicated.

The latter objective complies with the government's request: at the end of January, at a Ministers' Council, the government gave companies two months to sign an industrial waste agreement with the Agency for Environment and Energy Control (ADEME), Vincent Denby-Wilkes, the ADEME general manager, explained.

The ADEME and Business for the Environment are currently negotiating the amount of the manufacturers' contributions to solve this problem. An agreement would exempt companies, even non-members, from the new tax on waste, for which a bill will be introduced in Parliament during the spring session, he added.

The agreement with the ADEME should be signed "this week or next week," Mr. Denby-Wilkes said, adding that the objective is to have Fr40 million per year for five years, only part of which will be provided by companies.

The founding companies, most of which operate in high-pollution sectors, already spend over Fr10 billion per year on the environment, Mr. Fourtou recalled. He also emphasized that the Association intended to act as a lobby with French and European authorities, especially in preparing environmental standards and legislation. Mr. Jean Monod, the Lyonnaise-Dumez CEO, pointed out "the dangers of allowing EEC or GATT administrations to regulate without giving business a say in the matter."

The Association aims to increase the number of its founding members, "within three months," and to recruit as many members as possible in all French companies. For this, it is considering setting a lower membership fee for small and mid-size companies—the current fee is Fr100,000.

The Association vice presidents are the Lafarge-Coppee CEO, Mr. Bernard Colomb, the Renault CEO, Mr. Raymond Levy, the Usinor-Sacilor CEO, Mr. Francis Merand, and Mr. Michel Pecqueur, chairman of the CNPF [National Council of French Employers] environment commission.

Assessment of Ozone Layer Cautiously Positive

92ES0768A Paris LE FIGARO in French
22 Apr 92 p 10

[Article by Jean-Paul Croize: "Ozone: A Temporary Deficiency in the North"]

[Text] The surveys carried out by aircraft or by balloons based in Kiruna, in Swedish Lapland, have been analyzed. They reveal nothing alarming, at least for the near future.

The situation is less disturbing than was feared three months ago, but the reduction of the ozone layer in the northern hemisphere—especially over Europe—continues to be a source of concern. This is what is shown in the initial analyses of the European EASOE [European Arctic Stratosphere Ozone Experiment] experiments that involved measurements in the upper atmosphere—analyses that were made by the EC and presented by the French National Center for Scientific Research [CNRS].

Early last winter the initial measurements of the campaign led one to believe that this year we were going to experience a reduction on the order of 50 percent in the density of the molecules that constitute a barrier to the sun's ultraviolet rays.

"The initial conclusions," the EC Commission announces, "are on the one hand that the immediate danger of the formation of a major hole in the ozone layer over certain parts of the northern hemisphere appears to be reduced, and on the other hand that the phenomena manifested this winter are nonetheless disturbing." Fifteen of the Commission's experts met just this week in Brussels. Their objective was to draw up the initial balance sheet for this campaign, which is of an unprecedented scope. Operating with a budget of 140 million francs and having requested the cooperation of more than 250 international researchers, EASOE was carried out with the aid of three aircraft (which made more than 100 flights) and 41 sounding balloons. The data were collected daily by some 40 ground stations that were charged with retransmitting them to Kiruna, Sweden, where several tens of thousands of measurements were accordingly concentrated over a period of three months.

As is explained by CNRS-Info (Footnote 1)(CNRS-INFO, No. 241, 15 April), the principal results of the campaign can be summed up in a few essential points:

1. "The atmosphere of the northern hemisphere was seriously disturbed this winter, in particular by the presence of large quantities of natural aerosols"—those introduced by the eruption of Mount Pinatubo in June of last year. Confirming the impression obtained by the astronauts on the most recent flights of the American shuttle—who declared that the atmosphere appeared much more disturbed than previously—there are approximately 10 times more aerosols in the stratosphere than in previous years. "It is an unprecedented

situation that may have been caused by important interactions between the aerosols and the chlorine compounds," the CNRS notes, while the EC Commission believes that this situation "exercises a considerable impact on the chemistry of the ozone and increases the probability of ozone loss."

Chlorinated Pollution

2. The greater part of the chlorine released by the "CFC's"—the industrial chlorofluorocarbons—was in an active form during January and February, but its level subsequently decreased. It was accordingly during the winter that the chlorinated pollution was most capable of destroying the ozone.

3. On the contrary, the level of nitrogen oxide compounds (and especially of nitrogen dioxide compounds)—which have the distinctive characteristic of slowing down the destruction of the ozone—was particularly low this winter but subsequently showed a tendency to return to the normal level. In other words, not only was chlorinated pollution very active in our hemisphere these past several months, but the chemical compounds capable of combating its destruction of the ozone failed to make an appearance, without anyone knowing why. This could explain the very alarming aspect of the initial surveys made in connection with the EASOE campaign, while the return of more normal proportions of these atmospheric components subsequently diminished the seriousness of the threat.

4. Lastly, if the results obtained in situ—directly, in the atmosphere—throughout the campaign are compared with the extrapolations made previously by computer on the basis of more fragmentary measurements obtained primarily by satellite, the proportion of ozone was itself smaller than might have been expected—a circumstance that the Commission attributes "on the one hand to the phenomena of chemical interaction that have been ascertained, and on the other hand to the unusual atmospheric conditions that prevailed this past winter."

Be that as it may, it appears to the scientists that a hole in the ozone layer might indeed take shape above the northern hemisphere in the event of a very cold winter. Low temperatures do in fact have the effect of magnifying the quantity of active chlorinated components present in the stratosphere. "This is all the more likely to occur during future winters, inasmuch as the level of chlorine in the atmosphere will continue to increase," the scientists who took part in the EASOE campaign emphasize. It will in fact take more than 10 years for the measures adopted for the purpose of completely eliminating the CFC's present in aerosol containers, the foam rubber lining of furniture, or refrigeration systems to really bear fruit.

Industrialists Organize To Influence Environmental Policy

92WN0504A Paris LE FIGARO (LE FIG-ECO supplement) in French 6 May 92 p II

[Article by Sophie Roquelle, including interview with French Power Company President Pierre Delaporte; place and date not given: "Environment: General Mobilization in Industry"]

[Text] Fifty big employers from around the world are issuing a manifesto this week. EDF [French Power Company] has joined with six other international enterprises to establish a sort of "G-7" for electricity. Industry wants to be sure its voice is heard before policies are set making it the scapegoat for environmental problems.

An unexpected consequence of global warming is that temperatures have risen a notch in the boardrooms of certain European industrial groups. All are coming up with arguments or alternatives (backed up by studies) on how to meet the gigantic challenge of fighting the greenhouse effect which threatens the planetary balance.

This sudden concern about a subject previously relegated to scientists is easily explained. The greenhouse effect will be one of the main issues at the world conference on environment and development to be held 3-14 June in Rio. And industry, whose greatest fear is it will be saddled with the costs of the policies implemented to deal with this nuisance, wants its voice heard.

At Lausanne this week, 50 employers from around the world (including Jerome Monod) are issuing a manifesto on the environment and development. In France, 14 corporate leaders have joined together in Enterprises for the Environment, a lobbying group formed not only to influence the rulings made by Brussels on local issues (such as waste disposal) but also to participate actively in the larger global debates, one of the most important of which is over the greenhouse effect. One of these captains of industry, Pierre Delaporte, president of EDF, has even made common cause with six other electricity giants to offer some proposals on the subject.

U.S. Attitudes

In terms of international steps to deal with the greenhouse effect, the World Climate Convention is the object of negotiations this week at the United Nations in New York. Many obstacles still stand in the way of a text that can be signed by the heads of state and government in Rio. The EEC is at loggerheads with the U.S. administration, which opposes talk of quantitative targets for reducing emissions of greenhouse gases into the atmosphere. And wants to hear nothing about financial commitments. The main objection of the White House is simple: Global warming has not been scientifically proven.

Granted, the scientific evidence is still fraught with many uncertainties. The greenhouse effect itself is a natural mechanism that preserves the planet's temperate

climate. But scientists have proven that since the onset of the industrial age there has been an augmentation of greenhouse gases in the atmosphere, primarily carbon dioxide (CO₂) and methane. Increasingly, these gases are retaining the infrared radiation reflected by the earth; this is expected to entail a global warming of 0.8 to 1.5 percent by the year 2025, and 2.5 to 5.5 percent by the year 2100.

The consequences of such a climatic change are less well understood: a rise in sea-level, drought, etc. However, as Professor Yves Martin, an authority on the subject, points out in a report to the government: "If we wait to be certain of the degree of risk we run, it will be too late to avoid it."

On that point, European industry is generally agreed. As noted recently by UNICE [Union of Industries of the European Community], the European employer association, enterprises on the Old Continent are ready to participate "actively in the preparation and implementation of a well thought out Community policy" to combat the greenhouse effect. And by "well thought out" they mean nonfiscal.

Delocalization

Thus far the ideas coming out of the Commission have raised anguished cries of alarm throughout European industry. The European executive body envisages imposition of a \$10 tax on each ton oil equivalent of energy consumed, to be based 50 percent on CO₂ content and 50 percent on the actual quantity of energy used. In this scheme, nuclear energy, which produces no CO₂, would be taxed \$5, oil \$10, and coal, which is high in pollutants, \$14.

In France, "only industry is really affected by this tax," protests Gerard Jourdan, general delegate of the Federation of Nonferrous Metals. The eco-tax would mean a 5-6 percent increase in the price of motor fuels between now and the year 2000, and a 12-20 percent increase in the cost of heating, depending on type of fuel. At the same time, industry's energy costs would go up 30 to 50 percent, depending on sector. In the first two categories, the heavy taxes already in force would attenuate the effect of the eco-tax on final price.

Unless also applied throughout the OECD [Organization for Economic Cooperation and Development] countries and beyond, this plan would harshly penalize European industries in world competition. And Europeans note that the United States alone produces one-fourth of the entire planet's CO₂, compared to only 13 percent produced by the EEC, which has already greatly cut back on energy consumption. The eco-tax could only encourage investors to locate outside Europe. And a delocalization of heavy industry toward Third World countries "would obviously not be good for the environment," says Jean-Sebastien Letourneur, president of Eurometaux.

Tax Effects

The hypothetical tax would be based 50 percent on CO₂ and 50 percent on energy consumed, with 1 megawatt-hour being equated to 0.086 ton oil equivalent (TOE). Under the least onerous scenario, the cost of the eco-tax to French industry would be close to 15 billion French francs [Fr]. In terms of value-added percentages, the lime and cement industry would be hardest hit, along with

steel. On the other hand, the eco-tax would be almost painless for automotive builders: A tax totaling Fr246 million represents a very small percentage of value-added in that sector. Nevertheless, the automobile industry would suffer from the effects of the tax on gasoline. The ten industries most affected by the eco-tax are as follows, according to information provided by the Ministry of Industry:

Eco-Tax: Most Affected Industries

Industry	Value-Added Percentage	Total Tax (Millions of Fr)
1. Lime and cement manufacture	14.42	1,014
2. Ferro-alloy metallurgy	13.46	180
3. Steel	13.13	3,822
4. Fabrication of nitrogen fertilizers	12.66	174
5. Aluminum	9.85	276
6. Electrolyzed chemical products	7.11	218
7. Grain processing	7.08	5
8. Distillation of alcohol	6.48	35
9. Tile and brick fabrication	6.18	117
10. Sugar refining	5.80	343

Delaporte Interview

[Roquelle] Why issue an appeal from the world's seven biggest electricity producers on the subject of the greenhouse effect?

[Delaporte] The idea was born 18 months ago, on my last trip to China. That country's development is strangled by communications and energy. So the Chinese are making a concentrated effort. I told the leaders in Beijing: "You are burning immense quantities of coal under conditions that are not optimal. You could be ruining the planet for your grandchildren and mine."

I asked them what they would think about the international donors taking environmental considerations into account in big electrification projects. The idea took them somewhat aback. But after lengthy discussions, they told me they would be agreeable, if they didn't lose out overall. So I went to see the World Bank in Washington to talk to them about the idea.

[Roquelle] What did the World Bank officials think about it?

[Delaporte] Frankly, they didn't take me seriously! In their view, it would amount to promoting hydroelectric power, which has been considered ecologically horrible since the Aswan dam ruined all the local agriculture, and promoting nuclear power, which is another ecological horror, as Chernobyl demonstrated. This is true, but they forget that both were Soviet projects, that not all dams are like Aswan, and that not all nuclear plants are like Chernobyl.

Hence the idea of creating this "E-7" as an umbrella group for the seven biggest electricity producers in the world. I thought we would be more effective as a group, if we could reach agreement on a few ideas that would carry the prestige of our expertise.

[Roquelle] So, a sort of G-7 for electricity?

[Delaporte] Our group consists of two Japanese, two Canadian, and three European enterprises. None are American. We have not established a permanent organizational structure, and we hold informal meetings from time to time in different members' countries. The first meeting was held at the James Bay dam, in Canada's far north, in early April. Our goal is to think through one idea each year, with some "sherpas" to lay the groundwork beforehand, in an effort to come to some joint conclusions. We want to stir up ideas. At the Rio summit, the theme this year is the planetary environment, which basically means the greenhouse effect. Granted, this phenomenon has not been proven. But it is sufficiently disturbing that we should take action now, because if we wait until there is proof, it will be too late.

[Roquelle] What do you advocate?

[Delaporte] First of all, from a planetary standpoint, the impact is the same whether China or Germany produces 1,000 m³ of emissions. But a dollar spent in China will do 10 to 50 times as much good as a dollar spent in Germany, because German installations are already very good. So there is considerably more efficiency in improving China's coal-fired power plants than in improving their German counterparts. Second, when there is a choice, one can classify the various modes of

electricity production according to their degree of aggressiveness vis-a-vis the environment. Hydro is best. Next comes nuclear, if the technology is adequate. Then combined natural gas cycles, for countries that have natural gas, and finally there is clean coal combustion. The financial donors could factor this classification into their loan decisions.

Misguided Eco-Tax

[Roquelle] Do you think it's possible to take effective action against CO₂ emissions solely by manipulating lending policies toward Third-World countries?

[Delaporte] Effluents will not increase as fast. It is impossible to stabilize them completely. We can do it in France, perhaps, but certainly not in other countries. How can we ask a country like China to put the brakes on its development when it is 50 times less rich than we are! In East Europe, on the other hand, we can step in with substantial aid. We must scrap half the power plants and replace them with new ones. The other half need to be completely rehabilitated.

[Roquelle] Is that an alternative to the eco-tax, or a complementary measure?

[Delaporte] The eco-tax seems to us to be a mistake. At any rate, it is only a rhetorical threat. I do not think we will go so far as to impose an eco-tax as long as the Americans don't want to do anything. That would create considerable economic distortions. What's more, while the tax would spare the biggest consumers, it would hit nuclear-generated electricity, which does not even produce any CO₂! Is that sensible? Our idea is better: There are financial outlays that are infinitely more effective in one region than another.

[Roquelle] Don't you think the industrialized countries ought to set the example at Rio, instead of identifying the developing countries as the main source of pollution problems in the years to come?

[Delaporte] Indeed, we must set the example. France is a country whose energy conservation program has been successful. Without that program, we would be consuming the equivalent of 35 million tons of oil more per year. That's a lot. We consume 3.9 TOE per inhabitant per year. The European average is 3.45 TOE. As for the Americans, with a standard of living quite comparable to our own, they consume 7.81 TOE. Granted, the climate is not the same, and the distances are immense. But there are many things they could do there to conserve energy. Their consciences need to be pricked. One can understand why they are dragging their feet on the Rio Conference: They're going to find themselves in the position of the accused.

[Roquelle] Do you think an event like the Rio Summit is useful?

[Delaporte] Yes. It wakes people up.

Environmental Commissioner

Carlo Ripa di Meana is a gadfly. In a few short months, he has succeeded in incurring the hostility of industry all over the world, the American administration, a goodly number of European heads of state, and he has increasingly irritated his own boss, European Commission president Jacques Delors. It is a curious climax to the career of this 62-year-old Italian aristocrat, who by turns has been a journalist, director of the Venice Biennial, a Socialist deputy in the Italian parliament, a European deputy, and European Commissioner for culture. And always extremely persuasive.

Since becoming the head of "DG-11" in 1988, Carlo Ripa di Meana has applied all his talents as a communicator and his Latin outspokenness in the service of a single cause: the environment.

He has proposed a number of directives, including an anxiously awaited one on waste, loudly demanded the creation of a European environmental agency (an initiative blocked by France), and never misses a chance to skewer Community polluters in a highly public way. Last fall, for example, Carlo Ripa di Meana demanded that the British Government stop work on a highway extension project. The reason cited: No environmental impact study had been made. John Major's stinging retort was not long in coming: The esteemed commissioner should mind his own business.

'To the End'

But it is his plan to tax energy that now has drawn fire from George Bush and industries around the world. His "eco-tax" hit industry like a bombshell last fall. Nevertheless, it was approved unanimously by the commission and then the ministers of environment, before being stopped by the Council of Ministers, which asked the commission to reconsider the text before the Rio Summit. Attacked on every side during the preparatory debates for the summit, the plan now stands little chance of being adopted in the near term. "I will fight to the end," promises Carlo Ripa di Meana, who is stepping down from his position at year's end. Whatever the outcome of the Rio meeting, his struggle will not have been in vain. At least it had the virtue of forcing industry to speak out on a subject it had previously left to the scientists.

GERMANY

Thermo-Optical Compost Sorting Process Developed

92MI0356A Wuerzburg UMWELTMAGAZIN
in German No 3, Mar 92 p 64

[Text] Current sorting technology, especially as regards salvaging raw materials from domestic waste and for plastics, depends principally on mechanical separation

processes using, for example, rotary screens, air separators, or hydrocyclone and sink/float processes. Unfortunately, these salvaging processes are not always sufficiently effective to generate products with secure long-term market prospects as high-grade commodities.

For example, in the preparation of compost from domestic waste, it is extremely difficult to separate out the undesirable substances contained in the compost, such as very small fragments of glass and pieces of plastic, by screening methods. These undesirable components, which can constitute up to 20 percent of the compost, considerably impair the quality of the compost as a product. This lowers the acceptance level and sales prospects of the commodity.

In order to produce a high-grade compost with long-term sales prospects, RWE [Rhine-Westphalia Electricity Works] Disposal AG has invented and developed a process that it anticipates will considerably improve the quality of the compost. The process combines three techniques: Dielectric heating of the presorted compost, optical recognition of temperature differences using a thermal imager, and pneumatic separation-out of solids.

The sorting operation involves exposing the compost to defined microwave radiation on a conveyor belt. Whereas the aqueous components of the compost heat up in the microwave field, the temperature of the glass scarcely changes, since glass exhibits no polarity in a dielectric alternating field. A downstream thermal imager signals the position of the "cold" glass fragments to a control unit via a computer. The control unit operates a system of fine air jets that blow the glass fragments off the belt. The blow-away principle is already in use for sorting glass, albeit with a different recognition system.

The pilot project was started in mid-1990, and a technical facility for compost preparation is to be built shortly. It is planned to convert the pilot plant for applications involving plastics. Initial attempts at sorting plastics by the same method have been successful. Perlon [PA6], polypropylene [PP], polyethylene [PE], and polyvinyl chloride [PVC] granules have been separated from one another in this way. This recycling method would be a boon to the plastics industry, since the problem of reprocessing unsorted plastics has not yet been satisfactorily solved.

Purchases of Renewable Energy Cars To Be Subsidized

92WS0499C London INTERNATIONAL
MANAGEMENT in English Mar 92 pp 22-23

[Text] The North Rhine-Westphalia (NR-W) state government has announced a grant of up to DM10,000 (ECU4,896) for people wishing to buy electric cars—but on one condition. The electricity for the car must come from either wind or solar energy. Anyone who owns or has shares in a wind plant or a photovoltaic collector qualifies for the grant, as long as they live in the state.

The initiative features in a government drive to reduce carbon dioxide emissions.

The electric car grant is part of NR-W's renewable energy support and development programme, REN. Wind power in the region receives a level of support unique in Germany. The state tops up federal support to 75 percent of wind project investment costs—in some cases up to 100 percent.

Even so, wind harvesting in the land-locked region will never be as widespread as in the northern coastal areas. Lower Saxony has plans to install 1,000 megawatts of wind power by 2000. Currently, the whole of Germany hosts 654 wind turbines with total installed capacity of 90.4 megawatts.

To qualify for the new grant the cars must seat at least two people, have a minimum speed of 15 kph and a range of 60 kilometres at 50 kph. The new Flitzers are neither easy nor cheap to come by. Volkswagen recently produced an electric version of its popular Golf. But it sold at DM70,000 and only 70 were produced. Opel says it has a car ready for serial production, but sources say the price is 'likely to put off even the most dedicated environmentalist.'

Meanwhile, the North Rhine-Westphalia government says it has already received 'some' grant applications even though, according to an industry spokesman, no suitable car is yet available.

Alternative Energy Sources Discussed

92MI0344A Bonn WISSENSCHAFT WIRTSCHAFT
TECHNOLOGIE in German 4 Mar 92 p 5

[Text] Phosphoric acid cells for natural gas-fired combined heating and power systems with electrical outputs in the 100 kilowatt to 11 megawatt range were demonstrated at the 11th Conference on Hydrogen Power Engineering in Nuernberg at the end of February.

Other types of high-temperature fuel cells are also under development and appear suitable for large-scale electricity generation. Using fuel cells to generate electricity is expensive (mobile: 30,000 - 50,000 German marks [DM]; stationary: DM2,000 - DM5,000 specific costs per KW of electricity). In theory, electrochemical combustion of hydrogen in fuel cells is capable of 70-90 percent efficiency. Alkaline and membrane cells operating below 100°C are limited to military and space applications. Development programs have given an innovatory thrust to electrolysis of water.

The conference was organized by the "Renewable Energies" specialist committee of the VDI [Association of German Engineers] Power Engineering Association and by the VDE [Association of German Electrical Engineers] Power Engineering Association, in collaboration with the German Aerospace Research Institute, Solar Energy and Hydrogen Research Center, Bavarian Solar-Hydrogen, and the Society for Introducing Hydrogen

into Energy Management. Around 300 experts took part in the conference, which was led on the scientific side by Professor Carl-Jochen Winter VDI, Dr. Manfred Fischer, and Eng. Martin Fuchs VDI.

The conference discussed the latest technical and scientific results and the short- and medium-term options, from which it emerged that only a few collectible energies can be used in means of transport, as the energy has to be carried on board, refueling has to be possible, handling has to be simple and safe for the lay person, and the energy has to be available in large quantities and at low prices. The major reasons for studying hydrogen as a new source of energy are to protect the environment and to maintain the long-term availability of fossil fuels. Any change in source of energy triggers a chain of consequences. Pilot projects were presented.

Innovations grow out of research, development, demonstration, and marketing of technical components and the systems that they make up. The solar hydrogen energy system only achieves efficiency rates of below 10 percent. From the energy point of view it is important to take advantage of the high efficiency rates of fuel cells to enable the entire system to attain acceptable efficiency rates. Germany leads the field here with a number of systems and projects.

Great imagination and creativity were shown by the designers who presented their hydrogen-fueled world of the future at Nuernberg. Nevertheless, discussion of these ideas returned to the basic point that hydrogen is not a naturally occurring energy source. If hydrogen is produced from primary energy by water electrolysis, the fact remains that all hydrogen energy was previously electricity. There are thus advance plans for structural changes in energy management: Wherever possible, primary energy sources will be used on the spot, and the use of electricity will be stepped up. It is difficult to identify immediate scope for using hydrogen within the present system.

Researchers Develop Zeolith Filter for Chemical Emissions

*92WS0494B Duesseldorf VDI NACHRICHTEN
in German 27 Mar 92 p 31*

[Unattributed article: "Pollutants Can Be Effectively Removed From Exhaust Gas: Molecular Sieve for Exhaust Air: University of Stuttgart Develops Tailor-Made Zeolith Filter"]

[Text] Duesseldorf, 27 Mar—Exhaust gas can be purified by large-surface adsorbents, such as activated charcoal. More selective and effective than charcoal filters are so-called zeoliths, which filter pollutants from the exhaust current like a molecular sieve.

In the past, purifying gas and separating gaseous mixtures have been achieved through various adsorption methods, whereby activated charcoal is usually applied. In the future, the zeolithic mineral group (aluminum

silicates), which is characterized by outstanding adsorptive properties, should be used increasingly for this purpose.

The special crystal structure of zeoliths acts as a sieve that accepts certain molecules but denies access to others. Since the lattice openings can be effectively changed through the conditions during zeolith synthesis, accessibility and mobility in the crystal can be adjusted on a tailor-made basis, so to speak, for a specific filtering task. In addition, zeoliths are not combustible, and are thus suitable for use at higher temperatures.

In a research project headed by the Institute for Chemical Process Engineering, three institutes at the University of Stuttgart are jointly pursuing the goal of tapping into these advantages of zeolithic adsorbents for new areas of application. This is to be done on the basis of two different sample tasks: purifying exhaust air containing solvents from production enterprises, with extraction of the solvents, and isolating a vapor mixture from chemically similar substances. The Volkswagen Foundation has provided a total of 2.6 million German marks [DM] for the joint project, which is set to run for four years.

The Institute for Technical Chemistry has assumed the task of choosing types of zeoliths that appear suitable and of modifying them in such a way that they acquire optimal properties as adsorbents.

At the center for the second subproject, which is being conducted at the Institute for Synthetics Technology, the zeolith powder is processed into plastic molding material with good extrusion and shaping properties without detrimentally influencing the sorption properties of the produced form bodies. Finally, the task of the scientists at the Institute for Chemical Process Engineering is to select, develop, and test suitable processes; particular value here is attached to high separating selectivity and low energy requirements. Ultimately, the "Zeolithic Adsorbents: Synthesis, Shaping, and Process-Engineering Application" project should yield solutions for separating tasks that can be handled using conventional processes only with great difficulty or at great cost.

Abandoned Eastern German Mines To Become Disposal Centers

*92MI0357A Bonn DIE WELT in German
16 Mar 92 p 13*

[Text] Over 1,000 hectares of mining tips in the Lausitzer area and in the central German brown coal region will be converted into waste landfill and disposal sites over the next few years. Geotechnologists and engineers are already working with the managements of Lausitz Brown Coal AG (Laubag) and Central German Environmental and Disposal Company GmbH (Mibrag) and RWE [Rhine-Westphalia Electricity Works] Disposal AG, have equal stakes, on plans for disposal sites covering up to 70 hectares.

Is this overmined area now to be further violated by the creation of towering waste dumps? Mueg's project engineer, Wolf-Ruediger Jeschor firmly denies this. The future central disposal site at Croeber, south of Leipzig, where a total of 18 million cubic meters of this conurbation's domestic, municipal, and industrial waste will have been dumped by the year 2030, will not be an eyesore, despite its 70-meter height, nor will it pollute the soil, he claims.

He goes on to say that, as a rule, all opencast dumping sites are constructed above the table and lined with several sealing layers to guard against eluviation and seepage of pollutants, a totally different matter from the previous practice of simply dumping the waste into opencast holes. Ecological damage is virtually nil, says Ortwin Caldonazzi of Mibrag's corporate development department.

The infrastructure already in place at mining sites suits them well for use as disposal sites by local councils, which are increasingly faced by unmanageable mountains of waste, particularly as many council dumps in the new laender need to be closed and renovated. The Croeber site's capacity is regarded "by and large" as appropriate to its catchment area. Caldonazzi does not share public anxieties about waste from the older laender being "bussed" into eastern Germany.

Mueg, which was set up with 140 former Mibrag employees, coordinates and directs all stages in the development of dumps, from initial planning to completion. It also provides prefinancing, which it will recover from waste disposal charges, which will not exceed 100 German marks [DM] per private individual. Laubag's polluted site reclamation division, which has still to be formally established, is currently carrying out preparatory work on four council dumps. The company is working on the assumption that the councils that will operate them, will provide funding for the building work, says divisional Mader.

Laubag spokesman Siegfried Heinel admits that brown coal firms cannot expect disposal to hold out long-term business prospects; over the next 10 to 15 years, however, it makes sense, he feels, to help solve waste disposal problems, especially as the closure of opencast mines and brown coal plants already creates the need for site reclamation.

Along with the replanting of suitable mining land, two birds can thus be killed with one stone. Mibrag and Laubag will also need their own dumps when they fit their large-scale power stations with exhaust gas desulphurization systems. Mibrag's Caldonazzi does not regard these as waste dumps in the strict sense of the term, as the gypsum that is left as a byproduct of desulphurization is only stored temporarily pending reuse as a building material.

Climate Institute Forecasts Water Shortage for Next Century

92MI0380A Bonn DIE WELT in German
19 Mar 92 p 21

[Text] Germany will face a shortage of drinking water in 100 years unless CO₂ emissions are drastically reduced, according to the Fraunhofer Institute of Atmospheric Environmental Research, which warns that temperatures in Europe may be expected to rise by an annual average of up to 5° by the end of the next century. The Institute's director, Professor Wolfgang Seiler, stated yesterday in Munich that the Alps would face "extreme changes" which would have significant effects on drinking water supplies. Their impact would be drastic, and its effects on the ecosystem as a whole could not yet be foreseen, he said. During the last ice age, Europe's median temperature had averaged only 7° below its current value, and around 30 percent of Alpine glaciers had melted over the last 50 years. If emissions of climate-relevant substances such as ozone, CFCs [chlorofluorocarbons], methane, and carbon dioxide remained unchanged, a "gloomy outlook" was inevitable, stated Seiler, who is a member of the Bundestag Commission of Enquiry on "Protection of the Earth's Atmosphere."

Chemical Industry Adopts Environmental Protection Plan

92WS0491B Duesseldorf VDI NACHRICHTEN
in German 27 Mar 92 p 27

[Article by Ursula Schiele-Trauth: "Chemical Industry Prefers Process-Integrated Environmental Protection"]

[Text] VDI-N, Bonn, 27 March 92—Even when the German chemical industry refused a leading role in the Federal Environmental Ministry's planned waste turn-in program, as it did in Bonn in mid-March at a professional meeting of IG Chemie-Papier-Keramik, the industry is still on the way toward the development of an environment-friendly process. It is called production-integrated environmental protection because it is based on the reasoning that if leftover materials were not generated in the first place, they would never have to be disposed of at all. In the long-term, this concept should—in the economic sense—eventually outstrip the currently used "additive environmental protection measures," which are becoming increasingly more expensive.

To date, emphasis in environmental protection has been put on processes that are initiated after the actual production processes have finished. Sewage treatment plants, waste-air scrubbers, or heat treatment of wastes characterize this "end of the pipe" strategy. The Institute of German Industry and Commerce in Cologne has summed up the results achieved as follows: Even though production in the chemical industry has risen 200 percent since 1965, air contamination during the same period has been reduced by two-thirds, and the sewage load has been reduced by 90 percent.

But there has been a price to pay for this kind of environmental protection. For example, in 1990 the chemical companies in former West Germany had to lay out about 6.4 billion German marks [DM] for the operation of environmental protection facilities, i.e., an amount of more than DM17 million a day. A year earlier in 1989 the "daily going rate" was just DM14 million. Sewage purification alone consumes almost half of this amount, while another one-fourth goes to waste removal and air protection. Recently, at an environment symposium in Leverkusen, the head of Bayer company, Hermann J. Strenger, estimated that of the totality of investments "every sixth DM goes to environmental protection."

In the face of constantly increasing limiting values, this "additive environment protection" is already impacting its economic limits. As Dr. Dieter Becher of Bayer puts it: "Further improvements can only be made with exponentially increasing costs, and in the final analysis these procedures are only treating the symptoms." They do not conserve raw materials, but rather merely make leftover waste more environment-friendly by expending further raw materials and power resources. The fact that additional costs are constantly occurring is reason enough to search for an even more environment-friendly production-related method of eliminating waste. In this way, Becher believes "perhaps production could be kept at a constant level or, with a little luck, even reduced." The production of the mass plastic polypropylene (PP) is an example, where environment protection was forced to find a better process. For a decade, polymerization was carried out in a light, volatile solvent. This resulted in substantial air pollution, particularly during the separation and drying of the plastic. In order to satisfy the clean air requirements, the exhaust air would have to be led off through large adsorption towers. "It was technically possible to do this," according to Professor Guenter Lipphardt of Hoechst AG, "but simply too expensive." To process polypropylene this way would make it too expensive to sell.

Meanwhile, it has become possible to polymerize this plastic under pressure without a solvent. Before this can be done, however, new, highly effective catalysts had to be developed. According to Lipphardt, for years it had been assumed that they could not be developed.

Now, in new facilities in Huerth, Hoechst uses a catalyst system to polymerize propylene into the plastic polypropylene (PP). The production facilities of this, the second largest West European PP producer, can be operated with minimal sewage, exhaust air, and noise emissions, and still meet all the requirements for the protection of the environment.

In many cases, even today the effectiveness of catalysts is not thoroughly known. Their further development, therefore, may yield a great innovation potential. Just by means of greater recovery and improved selectivity, fewer by-products, which would later have to be

removed, would develop in many reactions. The chemical industry today is constantly seeking to find ways of reusing auxiliary agents like acids, catalysts, and organic solvents, but the cost of such recycled products often exceeds that of a new product.

Likewise, the attempts to utilize leftover materials, which previously were just considered waste, proceed. One example is sulfur made from flue gases. In many power plants, the sulfur dioxide is washed out with lime milk. Using this additive method, BASF in Ludwigshafen could obtain 35,000 t of gypsum a year, which, however would be difficult to market. Instead, the plant developed an adsorption method for the sulfur dioxide and then converts it into sulfuric acid, which is used as a key chemical in very many processes.

"This is a model example of what can be achieved with a 100-year-old product," exclaims Becher of the Bayer company about the intermediate product dye H-acid. In the past, the long synthesis chain of this naphthalene derivative was divided among several Leverkusen companies and accompanied through the many intermediate separations solely by considerable amounts of sewage and waste. In a new plant, this important product is now synthesized in an entirely different way.

The environment-related success balance sheet can be seen in terms of less use of raw materials, less amounts of sewage, and less solid waste for disposal. The improvements in processing still do not suffice to compensate for the additional costs incurred from new plant construction and new facilities. H-acid from India or China, produced in the old way, is still offered on the European market "at prices that in some cases are less than our production costs," Becher asserts. In the case of other intermediate product dyes, where similar improved processing techniques have been developed, the competitive situation was even worse, causing production to shut down in Germany. "That is a very bitter pill that does little to inspire work on a production-integrated environment-protection technique."

The restructuring of the processes requires a good amount of investment capital and is a tedious task in that each individual process has to be examined separately. And even in cases where a solution more friendly to the environment has been found, it usually takes about another five years to win official approval in Germany—much longer than in other countries. Meanwhile, Buechel makes the criticism, "increasingly stricter environmental protection laws are forcing the industry to make short-term decisions, use additive measures, which in the final analysis drain resources away from integrated solutions of the problem."

In the chemical industry, optimizing energy by power-heat coupling has a long tradition. After being released, the steam generated in the power plant's high-pressure boilers goes to the turbines in the plants, where it is used as process steam. The approximately 40 percent energy

utilization from normal thermal power plants can be increased in this way to 90 percent.

For chemical production processes, power is an essential factor. Only power can put the reactions in motion, and power is also required to separate the substances that are produced either by distillation or rectification. The "pinch technology," developed by Professor Bodo Linnhoff of Manchester University is a recent innovative technique to conserve power. The basic principle of this technique is that Linnhoff first identifies and secures all the currents of a chemical process that give off heat, be it residual heat from reactions, heat from exothermic processes, or heat from the combustion of residual materials, and then links them to the processes requiring heat.

With very few controls, Linnhoff has constructed a thermodynamically protected network, from which the engineer can read the minimal heating and cooling requirements very precisely. The analysis also shows the optimal temperatures at which heating or cooling energy should be introduced and permits an estimate to be made of the capital investment costs of the heat exchanger net. In this way, in the case of new or replanning, the most favorable variants of a process with respect to energy conservation can be identified in advance.

"In reality, there are about 30 to 50 currents to be observed in a chemical production process," Dr. Walter Lenz, a BASF energy expert explains. In this company, planning for the most efficient utilization of process energy gained very early acceptance. Despite an approximate 60 percent increase in production since 1970, the consumption of primary energy to generate steam and current was reduced by more than 50 percent.

World Support for German CO₂ Emission Policy Falters

92MI0409A Bonn DIE WELT in German
28 Mar 92 p 2

[Article by Heinz Heck: "Falling Between All Stools"]

[Text] Federal Environment Minister Klaus Toepfer seems determined. "The threat of climate change makes action on a global scale imperative," he stated after U.S. President George Bush's disappointing rejection of binding worldwide standards on reducing the greenhouse gas carbon dioxide, adding: "Germany will not use the negative American attitude towards CO₂ reduction as an excuse to waver over the measures we have already decided to take. Germany will continue to make its contribution to protecting the climate, and will, as decided by the federal government, reduce CO₂ emissions by 25 to 30 percent by the year 2005."

Toepfer's delivery of this major statement was low key, though there is now even greater urgency and relevance in the question: Just what is Bonn after? Does the federal government intend the country to go it alone in tackling a challenge that needs to be addressed on a global scale?

The answer is: yes and no. However stern Toepfer's warnings may sound, he still comes across as something of a Jeremiah. The government increasingly runs the risk of rushing headlong into a frenzy of action on an issue likely to lead to exceptional financial burdens.

It will be recalled that in November 1990, less than four weeks before the Bundestag elections, the government took the decision cited above by Toepfer with the stated intention of taking the lead in Europe, if not the West as a whole, in tackling the threat to the climate. Yet over two months before next June's UN Conference on the Environment and Development (UNCED) in Rio de Janeiro, one of whose purposes is to adopt a global agreement on the climate, it looks as if the leader may be short of followers. Not only is the United States, which is responsible for almost a quarter of CO₂ emissions and therefore bears the brunt of world criticism, refusing to be drawn; it is already becoming clear that Japan, too, is holding back.

Will the EC, though, be willing to commit itself to investing the billions required to achieve its target of stabilizing CO₂ emissions at 1990 levels by 2000? Obviously not, going by the outcome of last Tuesday's meeting of EC environment ministers, held even before Bush made his statement.

It would be as well at this point to explain the German attitude. Both the federal government and the coalition parties make much of the ambitious decision taken in November 1990; yet no one in Bonn seems unduly put out by the closely reasoned forecast published by the Economics Ministry that 12 percent is the maximum reduction feasible by the target year of 2005. They prefer to point to a Research Ministry study that suggests that a reduction "unequaled worldwide" would be achieved by building eight new nuclear power stations. However, an expansion in CO₂-free nuclear power in the present political climate in Germany is quite inconceivable.

The confusion is compounded by the fact that in December, in the wake of the unavoidable interdepartmental squabbling over the government's energy strategy, which is coordinated by Minister of the Economy Juergen W. Moelleman, the government agreed on the following strikingly evasive statement: "A 25 percent reduction in Germany's CO₂ emissions would translate into only 1 percent in terms of current worldwide anthropogenic CO₂ emissions. Going it alone nationally would, moreover, be risky for the economy as a whole. Global problems require global solutions." In other words, the 1990 cabinet decision will do not do much for the world climate, while it will have no uncommonly adverse effects on the already non-too-healthy economy—not to mention the fact that experts believe it cannot be implemented.

This begs the question whether Bonn's stance does not at least require clarification. It is difficult to fight for such a major objective as protecting the world climate from a position that falls between all possible stools. The federal

government's first priority should be to align its position more closely on the forecasts, if it is to appear realistic and therefore credible. Though some German politicians would still like to go it alone if Germany's EC partners, not to mention the entire western world, refuse to follow its lead, the government needs to make it absolutely clear that the country is willing to make a major effort, but only as part of a joint EC, or preferably international, campaign.

Meanwhile, the no less important debate on ways and means must be stepped up, focusing on the effectiveness of the methods to be used. Novices in these matters should be warned: Rio will be discussing the sums running into tens of billions reminiscent of previous UN conferences when appeals were made for similar sums for different purposes. Responsibility for CO₂ reduction must lie with those financing it, or it will not be effective. This much is obvious: industrialized countries with their massive energy consumption not only bear the major responsibility, but are alone in having the financial and technical resources to beat the hazards.

The German chancellor has a close personal interest in worldwide environment policy. He is hoping for success in Rio, especially as failure would overshadow "his" economic summit in July. A realistic negotiating position would hold out the best prospects for success.

Viability of Alternative Energies Reviewed

92MI0437A Wuerzburg *UMWELTMAGAZIN*
in German No 4 Apr 92 pp 118-119

[Article by Elke Ditterich: "Which Technology is Feasible? It All Comes Down to Cost"]

[Text] By the year 2005, the production of carbon dioxide (CO₂) in Germany is to be reduced by 25 to 30 percent (in relation to 1987). This target for trade and industry, administration, and the consumer was approved by the federal government in the middle of the year before last. This exemplary measure is intended to contribute to counteracting the climate-threatening greenhouse effect. However, the target can be met only if the consumption of fossil energy sources is significantly reduced. This can be achieved both by saving energy and by making greater use of renewable energy sources.

Effective Combined Processes

Everyone—industry, small businesses, and the domestic consumer alike—must save energy, but even power stations can play their part by using combustible fuels effectively in power generation. Over the last 20 years, modern technology has considerably increased the efficiency of power stations; the development of suitable combined processes has already made for over 50 percent efficiency. Various methods have proved useful for more effective fuel consumption, for example:

- Combined heat and power generation applied in district heating systems (the heat given off during

electricity generation is used for heating purposes by piping steam out of the turbine);

- Combined power stations (a gas turbine is installed upstream of the conventional steam power station, the exhaust gases from the gas turbine process serving as preheated combustion air for the steam power process);
- Gas and steam power stations (where only the combustion chamber of the gas turbine is fired; the hot waste gases generate steam for the steam power process via a heat exchanger).

The use of renewable energy sources, such as water, wind, solar energy, renewable raw materials, the heat of the earth's interior, or gas from waste dumps, as additional means of saving CO₂ will have to be further increased in the future. They contributed only 2 to 3 percent to primary energy supplies in the old German laender before unification. According to statistics from the Association of German Electricity Companies, renewable energies accounted for approximately 4 percent of the electricity generated in western Germany in 1990, hydroelectric power making by far the greatest contribution.

In the estimation of the states party to the WEC (14th World Energy Conference in Montreal, 1989), the renewable energy sources will still be dominated by hydroelectric power in the year 2020, whereas the prospects for solar and wind power are viewed pessimistically. It is forecast that the renewable energies will not exceed 10 percent of the total energy supply in 2020. Although renewable energies have considerable technical potential, their state of development must still be described as "embryonic."

A study carried out jointly by the German Institute of Economic Research and the Fraunhofer Institute of Systems Engineering and Innovation Research on behalf of the Federal Ministry of Research and Technology (BMFT) addressed the economic prospects for renewable energy sources. It was not possible to include the new German laender in the survey; however, their inclusion would not have led to a more favorable assessment of the renewable energy sources' prospects of success. The results of the study are illustrated in brief below:

Cost Reduction Foreseeable

—Solar Energy: Because of the low level of sunshine in the Federal Republic of Germany, the use of solar collectors is largely restricted to low-temperature heating, e.g., domestic water heating, space heating, or swimming pools. In the main, solar systems are not yet competitive for the first two of these applications, but markets may soon open up for space heating by solar-supported local heating systems.

In some cases, solar collector systems for swimming pools have already achieved economic viability. Both R&D work on potential cost reductions and demonstration projects are urgently needed.

Solar drying plants in agriculture have already proved economically viable, being cheaper than oil- or gas-fired hot air systems.

Solar heat power stations are virtually a nonstarter for the Federal Republic of Germany, but in areas that get a lot of sunshine, solar farms with channel collectors have proved commercially viable.

Photovoltaic systems based on crystalline and amorphous silicon require considerable further technical development before greater efficiencies and lower costs can be achieved. This method is mainly used to produce small-scale devices, such as calculator, watches, and off-net communications systems. Photovoltaic power stations must still be considered one of the most costly power generation systems. Grid-connected systems, for example, still cost around 10 times too much. However, major cost reductions can be anticipated in this area in the future.

—Wind Power: Measured in terms of the refunds payable for electricity input into the grid, small wind farms are already competitive, and medium-sized ones almost so. A further drop in construction costs, as has happened in Denmark, would provide the prerequisites for economical operation of small and medium-scale wind farms in the nineties. Even large-scale farms will increasingly start to pay their way. Efforts should be made to lay down uniform conservation, environmental protection, and type approval guidelines.

—Hydroelectric Power: Hydroelectric power stations have already reached a high technical level, and there will be virtually no further significant development in this area. Model calculations predict that smaller hydroelectric power stations will be profitable, and there is potential in the reactivation of decommissioned plant and the modernization of existing power stations.

—Renewable Raw Materials: The cultivation and combustion of renewable raw materials such as napier grass still requires much research work. In Denmark and Norway, fairly large plants burning straw and wood chippings are in operation, and functioning well. Exact figures regarding the plants of this type installed in Germany are not available. Whereas the high cost of supplying them with straw makes it unlikely that straw-burning systems will be economically viable, the wood-burning systems, which are admittedly not yet competitive, will become economical in the future as soon as oil prices rise even slightly. The potential for renewable raw materials is limited, however, by the total area available for cultivation.

—Gas From Refuse Dumps and Biogas: Despite increasing consumption, their contribution to power supplies will remain low in Germany. Without subsidies or concessions, biogas plants are scarcely economical at present; only rising energy prices could ever

make them competitive. Moreover, insufficient experience has been acquired to date to draw conclusions as to any problems that might arise in long-term operation.

—Geothermal Power: California, Mexico, Japan, and Italy are the main areas that exploit geothermal sources in the form of hot water or steam from the depths of the earth. Tectonically active regions, in which the magma extends to just below the earth's surface, are particularly suitable. Depending on the temperature, the water or steam can be used for heating or for electricity generation. In Germany, exploitation of geothermal heat is not widespread, although exploitable water-bearing strata would be available in the northern German lowland plain, the southern German Molasse basin between the Danube and the Alps, and in the rift valley of the Upper Rhine. Eastern Germany, too, presents favorable conditions, especially as extensive district heating networks exist there. Since no fuel costs are involved in exploiting geothermal heat, although the drilling involves high investment costs, the economic viability of this method is difficult to assess.

To sum up, it can be stated that only a few renewable energy sources can currently be exploited economically. Without high additional subsidies, their potential for use will remain low in the next 20 years. Pricing policy measures, subsidies, and tax concessions designed to promote the expansion of existing renewable energy technologies should therefore be the aim.

New Biological 'Oil Eater' Product Developed

92MI0435A Wuerzburg *UMWELTMAGAZIN*
in German No 4, Apr 92 p 68

[Article by Klaus Niehoerster: "Oil Cleared up in Record Time—New Product Has Many Uses"]

[Text] The crucial test came in mid-September of last year. In thick fog, two tankers collided on the Rhine, and three tanks of one ship, traveling downstream and laden to the brim with heavy fuel oil, were torn open. The river received an unimpeded flow of 165 tonnes of diesel.

Two hundred firefighters were immediately called in on the left bank of the Rhine between Stuerzelberg and Krefeld to deal with the 1 kilometer long oilslick. They were relying on the cleansing power of a very special agent: They sprayed the bank area with an "oil eater" and left it to this preparation and the voracity of bacteria to clear up the consequences of the collision.

Astonishing Effect

Klaus Eiland, managing director of the Dormagen-based Sintac (Safety Technology and Environment Protection Corporation), says the enormous pollution elimination potential of "Syntan," his company's new decontaminating agent, can be unleashed "wherever work involves grease or oil, drilling or cutting oils, fuels or lubricants."

The removal of oil-spills from concrete and asphalt, cleaning of grease collectors, large kitchens, deep fryers, air-conditioning systems, and even circuit boards and logic elements—the experts at Dormagen address all of these problems.

What they are using is the insatiable appetite for oil of a long-chain bioalcohol extracted from coconuts. Its action is based exclusively on “physical and biological” effects.

According to the surface cleaners, the agent is sprayed onto the contaminated area and, after only two seconds, starts to penetrate the polluted layer. The preparation distributes itself evenly and slides underneath the oil; the oil film is broken and tiny beads of oil form.

When water is added, the separate beads lose their hold and are flushed out of the ground. After a settling period, the oil can be separated off.

Even without bacteria, ventilation or other aids, “Sintan” achieves 71 percent oil degradation in water. If microorganisms are also present, the degradation rate leaps to 99.7 percent within a record time of three to eight hours—as demonstrated by the Dr. Biernath-Wuepping Institute of Water Conservation and Environmental Monitoring in Kiel. In the “oil eater,” the bacteria find a nutrient medium, multiply astronomically, and convert the hydrocarbon. Luminous bacteria and daphnia (entomostracan) tests have confirmed its biological safety.

The Walter Hennige Institute of Paint Testing in Giessen applied a concentrated mixture of contaminants, comprising engine oil, gear lubricant, lubricating grease, bentonite, black iron oxide, and carbon black, to a concrete garage floor, and added the separating agent after three days. The result: After an eight-day drying period no difference could be seen between the contaminated area and the remainder of the concrete floor. The dirt had disappeared without a trace.

The innovative Dormagen company is directing particular attention toward gas stations with their overfilling problems, toward refineries, small and medium-sized metal-working and processing enterprises, and large-scale chemical works. “Sintan” avoids the need to break up concrete on the work site, a costly job, and remove it to special waste dumps. And the trump card is that work can continue while treatment is under way.

Wide Interest

Repeated treatments will remove oil that has penetrated three to five centimeters into the concrete surface. The elimination of contamination as much as 20 cm deep—this is the limit—is estimated to take some months. The Lower Water Authorities and the municipalities are showing great interest in this simple method, which can be easily used even by the layman.

The insurance companies are greatly interested in limiting widespread oil pollution, and 230 members from the

insurance sector and industry have established their own research institute, the IST or Institute of Safety Research and Environmental Engineering in Dormagen, which has granted 6 million German marks [DM] to fund the development of this preparation. “It has been such a success,” reports IST chief Dr. Reiner Schuette with pleasure, “that we are now able to solve almost 90 percent of all cases.” In his estimation, “Sintan” is the obvious substitute for fluorinated and chlorinated hydrocarbons, which have been used hitherto as degreasers.

The product comes up against limiting factors, however, if the cleaned end product is required in a dry state. As the process is water-based, a downstream drying system, such as a hot-air fan, would have to be installed. According to Schuette: “Not every company is prepared to do this.”

Electric Waste Collection Truck Developed

92MI0436A Wuerzburg UMWELTMAGAZIN
in German No 4, Apr 92 p 84

[Text] Since the air in inner cities is heavily contaminated as a result of the huge number of vehicles, domestic boilers, businesses, and industrial firms, this is where electric vehicles are particularly useful. They emit no exhaust fumes and run virtually without noise at low speed. From the point of view of the energy consumed by the electric drive, power station generation causes only a fraction of the emissions produced by an internal combustion engine. For this reason, more and more manufacturers are offering electrically powered utility vehicles for local authority use.

The Pfau company of Springe, together with RWE [Rhineland-Westphalia Electricity Company], have thus developed an electrically-powered municipal vehicle which, with an overall weight of 2.1 tonnes, still allows for a useful load of 400 kg, despite the high battery weight. The vehicle is equipped with a garbage collection container and is specially designed for the manual discharge of paper and refuse bins in inner-city areas, pedestrian precincts, parks, etc.

The comfortable, spacious driver's cab makes for fatigue-free operation even in all-day use. The sliding hatches of the container can be opened and closed without any great effort. The garbage container is emptied via the tailgate in a tilted position.

The electric motor is powered by batteries with a capacity of 160 ampere-hours. Charging takes a maximum of 11 hours via the built-in charger (220 V) or about four to six hours with a static charger (380 V). At a constant speed of 50 km/h, the vehicle's range is approximately 80 km, about 55 km in the urban cycle. This range generally equates to one day's downtown use, so the battery can be charged overnight without problems. The built-in charger can be connected to any 220-V

power point. Moreover, the top speed of 70 km/h ensures short journey times to and between jobs, and even allows highway driving.

Gas Removal System Installed in Waste Dump

92MI0434A Wuerzburg UMWELTMAGAZIN
in German No 4, Apr 92 p 41

[Text] In an area totaling 50 hectares right beside the highway to Salzburg, north of Munich, lies the Grosslappen waste dump. Household refuse, sewage sludge, and building rubble from the Bavarian capital have been dumped here since 1954. Despite approval for the level to be raised, by the end of 1987 it was full to capacity: Around 14 million cubic meters of waste had been piled up to a height of some 73 meters using controlled dumping methods. However, the earth cover used was too thin and consisted of gas-permeable gravel. As a result, subsidence caused 50- to 100-meter long fissures to appear, through which gases, primarily methane, escaped from the body of the dump.

In future, the gases produced will be captured, collected, removed, and disposed of ecologically by an active degassing system. The Munich Waste Management Office has made 8.7 million German marks [DM] available for the construction work, which began in August 1990. The gas collection target is 60 percent, which means 2,000 cubic meters of gas per hour.

In the past, only a part of the gas was collected on surfacing and burned off by 15 gravel column gas wells. The new, active degassing system consists of the existing gas wells, which have been renovated, and 28 new ones. The gases are extracted and fed into the gas collection station through an overground pipe system. Here they are burned off under electronic control, the water vapor being separated out to increase the quality of the gas and ensure better combustion. But even this degassing system, which is scheduled for completion by March or April, is not the definitive, optimum solution. Starting in 1996, the heat produced when the gas is burned off will be used for electricity generation and for a district heating system.

The second stage of the renovation work involved replacing the soil cover, which had been contaminated by underground combustion and methane gas. The 4,500-square meter soil surface was removed to a depth of 2.40 meters and taken to a hazardous waste dump. The waste mass was covered with a layer of brick clay roughly 40 cm thick covered by two meters of earth. The layer of clay prevents gas from escaping to the atmosphere and seepage water from penetrating down.

Such costly improvement work will not be necessary in the future. The Northwest Munich dump located opposite Grosslappen has a degassing system with underground pipes. Here the gas produced is extracted under vacuum and will also be used for power generation. To prevent gas escaping into the atmosphere, the earth

cover consists of brick clay, which is impervious to gas, laid to a total thickness of four meters.

Siemens Generates Power From Waste Incineration

92MI0441A Bonn DIE WELT in German
9 Apr 92 p 13

[Article by Juergen Wintermann: "Electricity and Raw Materials From the Daily Garbage Mountains—Siemens KWU Develops New Incineration Process"]

[Text] For the first time, modern throw-away society has the chance to escape death by suffocation in garbage, at the same time conserving the earth's resources. Recognizing that valuable reusable substances are buried in domestic refuse, Siemens KWU [power engineering division] has been working for 10 years on solving the problem and has invested 100 million German marks [DM] in development. Now the project is ready for industrial application. "Low-temperature incineration process" is the name of the miracle whereby the daily garbage collection is fed in at one end and metal, aluminum, aggregates for road construction, and electricity come out at the other. The impact on the environment is virtually nil.

The plant can handle not only domestic garbage, but also industrial waste and domestic sewage sludge. Of an original 1,000 kilograms of garbage, 999 kilograms are recycled and utilized. All that remains at the end is just 1 kilogram of residue, to be disposed of as hazardous waste, solution in which local authorities are showing increasing interest. "We are already having talks with 40 to 45 interested parties," said Adolf Huettl, Siemens board member and head of Siemens KWU. The first plant designed to handle 100,000 tonnes of domestic garbage annually is planned for Fuerth in Bavaria. The Japanese have recently obtained the first license for the technology from Siemens. Automobile concerns are behind this move, as the low temperature incineration process can even recycle automobile scrap.

However, the low-temperature incineration process does solve the garbage disposal problem free of charge. A 100,000-tonne plant requires a DM190 million investment. Added to this are the running costs, calculated at DM330 per tonne of garbage. On the other hand, there is a ready market for the products extracted from the garbage. For instance, the residue-free and completely inorganic clinker for road-building currently fetches DM6 per tonne. The refining foundries are already paying from DM2 to DM5 for the high-purity metal output, the trend being upward. Even the electricity brings in DM36 per tonne of garbage. After deduction of these proceeds, which total just under DM50, this leaves net disposal costs of DM280 per tonne of garbage. However, the low-temperature incineration process is still 25 to 30 percent cheaper than conventional garbage incineration.

But the aspect that should count for even more is that the strict limits laid down in the federal law on emission restriction are met by a wide margin. This was demonstrated in the pilot plant in Ulm-Wiblingen, where the process has been tested and improved over a number of years. The technical trick consists in using a two-stage process instead of the usual grate firing. The garbage is first hermetically sealed off and converted to low-temperature carbonization gas at a temperature of 450°C, at which point the metals and residues are extracted, then the remaining pollutants are incinerated at high temperature with the combustion of the low-temperature carbonization gas at 1,300°C. The exhaust gas that this generates is purified by the standard process, which also removes dioxins and furans.

Even the Green Party and environmentalists, who usually present allergic reactions to any industrial plant, have expressed enthusiasm. Only the really cunning warn against the low temperature incineration process: "If this supertechnology really comes in," they fear, "the pressure will be off the public to avoid producing garbage at all."

ITALY

Novamont To Build Vegetable-Oil Fuel Production Plant

92WS0424B Paris AFP SCIENCES in French 5 Mar 92 p 46

[Report: "Novamont (Ferruzzi) to Open a New Green Fuel Plant"]

[Text] Paris—The Ferruzzi group's Italian firm, Novamont, announced on 2 March that it plans to build a new plant to produce fuel from vegetable oil esters "shortly." The plant will have a capacity of 100,000 metric tons a year.

"The use of vegetable oils as a raw material for fuel and combustion is becoming an agricultural, industrial, and political reality in Europe," said Mr. Claudio Rocchetta, the vice president of Novamont, at the International Agricultural Show in Paris. France has a good chance of being selected as the site for the factory.

Novamont's star product in the niche is Diesel-Bi, which took two years of research to develop and can be made equally from rapeseed, sunflowers, or soy beans. The product is a vegetable fuel with chemical properties very similar to those of gas oil. It can be used in either pure or diluted form in diesel engines.

The Novamont group has already reached agreements in France with the metropolitan community of Dunkerque (North), whose buses now run on a 50/50 mixture of gas oil and Diesel-Bi. Other agreements are being negotiated with Dijon, Bordeaux, and Vierzon.

But there is one drawback, which some consider major: The price of fuel is "fairly high." Diesel-Bi costs from 50

centimes to 1 French franc [Fr] more per liter than gas oil, despite legislated tax concessions. Since 1 January, all biofuels in France enjoy a five-year exemption from the TIPP (domestic petroleum products tax). In Novamont's case, only "mass" production can reduce its costs.

NETHERLANDS

Geothermal Heat Considered as Energy Source

92BR0259A Rijswijk POLYTECHNISCH
TIJDSCHRIFT in Dutch Mar 92 p 8

[Article: "Profitable Terrestrial Heat Is Not Really Getting Off the Ground"]

[Text] Geothermal energy in the form of hot water pumped up from the subsoil can be used profitably in the Netherlands to heat houses, offices, and horticultural greenhouses. In addition, the use of this environmentally safe source of heat is almost the cheapest way to reduce CO₂ and NO_x emissions. The full exploitation of geothermal heat resources available in the Netherlands could result in a savings of 3 to 4 billion cubic meters of natural gas per year.

This was written by Professor Dr. F. Walter from the Faculty of Mining Engineering and Oil Development in a recent issue of DELFT INTEGRAAL, the scientific magazine of the Technical University of Delft. In neighboring countries with the same geological characteristics as the Netherlands, hundreds of thousands of houses are already being heated this way, whereas the Netherlands does not even have one single power station. According to the professor from Delft, this lack of interest in geothermal heat is attributable to the energy companies' unfamiliarity with it and the huge gas reserves available in the Netherlands.

This calls for a brief explanation. If someone were to descend deep down into the earth, it would not be necessary to take along many clothes. Every 100 meters, the temperature increases by roughly 3°C. The permeable, porous layers (aquifers) that are found at a depth of 2,000 meters hold water which has a temperature of 60° to 70°C. By pumping up hot formation water and by passing it through a heat exchanger, about 4,000 houses can be heated per doublet [source and drain wellbore]. Because formation water is salty, it is reinjected into the aquifer via a second wellbore after use. Together, these wells form a doublet. In the Netherlands, geological conditions are propitious to the production of geothermal energy. According to Professor Walter, an aquifer at a depth of 2,500 meters with a temperature of 80° to 90°C can supply between 7 and 9 MW of heat.

The costs involved in geothermal heat exploitation in the Netherlands should not be prohibitive, since part of the infrastructure needed is already there in the form of wellbores and urban heating networks servicing 150,000 houses. Every year, five test bores are made which

produce only hot water instead of oil or gas. By adding a second well to such an existing well, the required doublet is obtained. Professor Walter calculated that this would reduce the start-up expenses for a geothermal power station by more than 6 million guilders to only 13 million guilders.

In 1992, the NAM (Dutch Oil Company) is going to carry out an exploratory drilling in Delft-South. If only water is found instead of oil, it will surrender the well for the production of geothermal heat.

NORWAY

Prime Minister Defends Environmental Policies

92WN0457A Oslo AFTENPOSTEN in Norwegian
11 Apr 92 p 3

[Article by Ole Mathismoen: "Norway Not Falling Behind Environmentally"]

[Text] Gro Harlem Brundtland has had enough of the criticism that Norway is lagging behind environmentally. She said it just harms the environmental cause and she lashed back at other parties, environmentalists and others who claim we could have gone further.

The prime minister thinks the criticism is unfair: The nonsocialist parties' environmental election campaign in 1989 turned out to be nothing but short-term populist promises. The environmental organizations and SV [Socialist Left Party] are giving other countries a false and very harmful impression of Norwegian environmental efforts. Although people respond positively to environmental issues in opinion polls there is always criticism of new environmental measures that cost something. Only children received her praise: "I put my trust in them."

In June world leaders will gather for an environmental summit meeting in Rio. At this time the prospects do not seem bright and the prime minister is the first to admit that it is hard, extremely hard, to change course and move toward so-called sustainable development.

"The Rio meeting will be a fiasco if it ends in a split and state leaders are unable to reach a decent agreement on some points. But there is still hope that there will be a breakthrough for real progress. We must do everything we can to avoid a fiasco. We must keep fighting until the conference begins and while it is going on," she said, showing no sign of giving up. George Bush and other national leaders who sit on the sidelines in the environmental struggle should take note: Mrs. Brundtland is prepared to fight!

Important Campaign

She is pinning her hopes on the American election campaign.

"I hope things develop in such a way that it will be safer for President Bush to go to Rio and demonstrate that he is the environmental president he would like to be than to stay home and avoid committing himself to anything concrete. The fact is that a campaign in such a big country could have a decisive effect on the entire Rio conference," she said.

On 23 April it will be five years since Brundtland became world famous. The Brundtland Commission's report, "Our Common Future," has earned applause around the globe. But since then the world population has increased by 500 million people. Most of them are extremely poor. The environmental crisis has become even worse.

Creating Awareness

We noted that there is no sign of important steps toward a sustainable society. Must we wait for a crisis, an ecologic collapse, before something happens?

"Dramatic events create greater awareness and the basis for change. The catastrophic drought in Africa, the explosion in the chemical factory in Bopal, India, in which several thousand people died and of course the Chernobyl disaster in 1986. But if by crisis you mean the collapse of the earth's ecosystems, I hope this will not happen. Even though decisive steps have not been taken we are in the middle of a process and I have no doubt that something tangible will come out of it. Acute events create awareness and help prevent the crisis that would otherwise ensue," said the prime minister, who is not surprised that the population growth is continuing at a rapid pace.

"We knew the population would increase for the next 50 years no matter what measures are initiated. That was perhaps the most frightening conclusion we drew. And there is no doubt that the population growth is not being taken seriously enough. Poverty and environmental crises are closely connected. Achieving better living conditions and inspiring greater hope in the future among the poor part of the world are vital for achieving sustainable development."

Norway a Driving Force

We commented that the big problem now seems to be that no country has the courage to take the lead any more. They are all waiting for everyone else. Norway is waiting for the EC and the EC is waiting for the United States. Are short-term economic interests making the transition to a sound society impossible?

"The fact that some have taken the lead and established their goals and then put them into practice has been decisive for the many processes that are now under way. But the momentum of such vanguard actions is not enough in itself.

"Norway is not waiting for the EC but we are concentrating on getting a consensus basis clarified that will include all countries in a cooperative plan. We are now

in the middle of a negotiation process where everyone depends on the intentions of the others and everyone is waiting for everyone else. That is always the way it goes. In this process Norway is a driving force by virtue of its own actions and constructive proposals and the pressure it has put on others to take new steps. But if we now screw it up another notch it will have little effect. Most would just shake their heads and say that what Norway is doing lies entirely outside what we can discuss and consequently it could have a negative effect on the talks. However it is extremely important to remember that the somewhat hesitant attitude we are now seeing is not the same as passivity. We are in the middle of decisive discussions," said Brundtland who emphasized that after the Rio meeting there will again be a need for the nations that are in the vanguard to take further steps.

Irritated

But won't it be painful when those attending the international meeting become aware that Norway is no longer in the very front line? Up to now Norwegian environmental organizations have used every opportunity to tell the world that we have been dragging our feet on the environment.

The prime minister became irritated: "It most certainly will not be painful to be a Norwegian in Rio. I think it is painful that our environmental organizations are using their energy on the wrong thing. I have thought so for the past five years. It is increasingly painful to see the effects this has had. I do not see the point of trying to create the impression that we are not doing what we actually are and that we do not stand behind what we say. This creates a lack of confidence in the ability of democratic processes to lead to anything. That is the impression that remains. The only chance of coming up with agreements is for governments and parliaments in the various lands to support them. So there must be discussion," she said. In consequence she is highly critical of those who try to spread a false picture of Norway's efforts:

"And I would just like to say that it will not be painful to go to Rio and know that we are giving three times as much aid to developing countries as the other industrialized nations and that our aid is primarily directed toward poverty, health and the environment. If all the industrialized nations had done the same as Norway we would actually be able to pay the cost of implementing the plan of action that will be approved in Rio. It is said that \$125 billion in annual aid from North to South is unrealistic. That is not true. Nor will it be painful to tell the others that we have long since fulfilled our pledge to reduce sulfur dioxide emissions or that we are one of the few countries that have ratified the Montreal protocol and the Basel convention. Nor is it painful that we were one of the very first countries to set a clear CO₂ goal even though we export oil and gas."

Forest Conservation

But will it be a problem for the prime minister to demand the protection of tropical rain forests when

researchers say the conservation of coniferous forests is too weak to protect our own species?

"A conservation plan for national parks is now in the works. And then Norway will be the country that has protected the largest area: 10-12 percent of the mainland. If we include Svalbard, 18-20 percent of the Norwegian landscape will be permanently protected. We will then have met the demand the developing countries have made to the industrialized nations as a condition for protecting large tropical areas. We must protect typical Norwegian natural features and Norway is not primarily a country of coniferous forests. But we have also protected a lot of our forests and there is nothing that we have to apologize for."

How long will it be possible to continue to solve short-term social problems, such as unemployment, with traditional economic growth and industrial growth?

"The substance of today's growth policy cannot continue. That was the main message in the commission's report. The trends are moving straight up and this can only have bad results. Making changes is a vital necessity. And how can we turn things around? In Norway we have made an effort by combining taxes on fossil fuels with the usual restrictions. This has laid the foundation for change because we are making it expensive to continue in the same old way. And we can proceed on this course with increasing speed if we get an international consensus that protects us from being placed at a competitive disadvantage that would lead to political opposition and a great outcry on all sides."

Special Country

But there is still a lot of traditional growth thinking in Norwegian politics too, we pointed out.

"We are a special country. With a scattered population, great distances and an industry based on water power, it is often more difficult to do something here than it is in many other countries. Therefore percentage comparisons of CO₂ levels are misleading. They give a false picture. If a country manages to make a 30-percent reduction in CO₂ emissions by shutting down a few power plants but does nothing about the remaining energy consumption it does not impress me. This means that the country will go on contributing to the problem with unreasonably high pollution levels," said the prime minister who stressed using the best technology available.

How does it feel to be an environmental prophet, one who is respected in other parts of the world, when she generally gets only criticism at home?

"This is a paradox that I have grown used to living with," she said and aimed a powerful blow at the domestic political witches' cauldron:

"An ambitious Labor Party will always come under dual fire. One side claims that we are not progressive enough.

The other side is largely silent. Even though they would not propose the same environmental measures themselves they vote for what we do because it is inexpedient to vote against it. They do not want to be branded as enemies of the environment. Therefore we get a lopsided picture. The government receives majority support while the only critical voices that are heard claim that we are not going far enough. SV's criticism and the nonsocialists' silence camouflage the fact that the Labor Party has always put the environment and aid to developing countries on the agenda and implemented the right kind of policy and that Norway stands out internationally as a driving force. The entire policy was created by Labor governments. Yes, SV even praises Willoch who was responsible for a lengthy environmental moratorium and gives the impression that it doesn't matter who is in power. This is paradoxical but nothing can be done about it. But when they abuse this abroad and spread falsehoods about Norway's environmental policy they hurt decent people and harm both the environmental cause and their own country. As an individual I am unimportant, but the criticism attacks Norway's opportunity to influence others."

The prime minister referred to the 1989 Storting campaign: "The middle parties and the Conservatives stressed the theme that the government's environmental goals were not ambitious enough. Everyone who follows these parties knows that when it comes to the point and the goals have to be implemented we hear a different tune. We get proposals for gas power plants from the Conservatives, a totally indefensible policy. Consequently the nonsocialists' environmental campaign turned out to be nothing but short-term populist standpoints."

Is the current generation of politicians so set in the tradition they grew up in that we will have to wait for the next generation to arrive at this international consensus?

"In the generation of politicians I belong to myself there has been substantial internal disagreement in the parties. There was more active, deliberate and vocal debate on the place of environmental protection 10 years ago. This issue has produced a great deal of tension and conflict for 20 years now. For every new generation that comes along the impact of the criticism of the old growth methods increases."

Trusts Children

But are most people ready for real environmental changes? "Every time we implement environmental measures that people feel, such as making it more expensive to buy polluting products, they react negatively. This happens even if we simultaneously lower other taxes by a similar amount. Introducing new measures has a price tag. Even though people respond positively in opinion polls, there is a gap between that and what they are really prepared to do. In other words there is no ground swell of demands to implement concrete environmental measures that affect people's

daily lives. But because there are many children who are learning and getting involved there is hope. Children are extremely important. They ask their parents bold and obvious questions. I rely most on children. That is where things stand."

Norway, Russia To Investigate Nuclear Waste Dumping

LD0705094692 Stockholm Radio Sweden in English
2100 GMT 6 May 92

[Text] Norway and Russia have agreed to set up a joint expert group to investigate the amount and location of Soviet radioactive waste which has been dumped into the Barents and Kara Seas north of Norway and Russia and to determine if it is any threat to the local population. The environmental organization Greenpeace estimates that some 7,000 tonnes of solid radioactive waste and some 15,000 cubic meters of liquid wastes have been dumped into the area.

PORTUGAL

New Environmental Laws To Introduce Financial Incentives

92WN0530A Lisbon O INDEPENDENTE
in Portuguese 8 May 92 p 32

[Unattributed report: "Borrego Launches 'Green Quantum'"]

[Text] Attention, businessmen! The environmental pact, representing the first effort made in Portugal to attack pollution from the economic and financial point of view, is coming. Thanks to this veritable "Quantum Verde" [Green Quantum], Portuguese businesses will shortly have additional reasons to respect the environmental legislation. The fact is that the government has discovered that, when it comes to developing businessmen's awareness of environmental issues, affecting their pocketbooks produces vastly better results than appealing to their feelings.

In fact, to judge from what Carlos Borrego, minister of the environment and natural resources, has revealed to O INDEPENDENTE, a series of new economic and financial tools for environmental legislation is ready to be announced. They will attempt "to persuade" the industrial units to treat their effluents and byproducts and even to review their production methods, with a view to reducing emissions of toxic residues and gases into the atmosphere.

For example, after this new law is published, a policy of "He who pollutes, pays" will go into effect. Enterprises will pay a tax for releasing gases such as sulphur dioxide, nitrogen dioxide, and other particles into the atmosphere, or for using river waters, even if they treat them before returning them to the river channels. The income obtained from these taxes will go into a fund to be used

to finance industrial enterprises that want to modernize their environmental technology.

Another tool included in the new rules will be the provision of tax advantages. Enterprises that choose to locate at the industrial poles established by the municipal chambers will enjoy these advantages. At these poles, apart from better use of industrial space, there will be special centers for the treatment of waste substances and the collection of refuse. "We must encourage enterprises to establish their facilities in these localities," the minister said.

Carlos Borrego says this complex of new rules will serve to bring the oldest industries up to the level of the newest ones with regard to environmental concerns. "The new industrial concerns have already been planned and approved within the context of environmental legislation. The problem now is how to control the older enterprises," he said. He explained that the secret of drafting good environmental legislation lies in knowing how to combine two ingredients—fines and tax incentives—in the proper proportion.

To ensure technological conversion and the installation of emission-control equipment, the Ministry of the Environment and Natural Resources is now planning to sign protocols with various sectors of industry, such as those producing pork and paper pulp, as well as the tanning, distilling, and oil-extracting industries. He went on to say that business circles are expected to give the Protocol on Adaptation to Environmental Legislation, which was drafted within the Ministry, a rather positive reception. This document gives businesses three years in which to complete their conversion, and, during this period, the government will defer taxes, provided that each enterprise submits a report on its projects every six months.

But the industrial issue represents only one aspect of a broader strategy that has already been christened the "Environmental Pact." The other part of the pact will involve the self-governing bodies. The government wants to establish protocols with these bodies, much as it will with the industrial sectors, to ensure the investment needed to improve infrastructures like the water, sewage, and garbage-collection systems.

The goals the Ministry of the Environment and Natural Resources hopes to achieve by the year 2000 call for providing 95 percent of the population with water (it now supplies 77 percent of the people), providing 90 percent with a sewage network and treatment (currently 20.9 percent of the population is served), and providing 100 percent of the population with garbage collection and treatment (as compared to 42.3 percent at present). A total of 315 million contos will be required to establish the new networks, and 124 million will be needed for the modernization of the networks already in existence.

SWEDEN

Environment Minister Proposes Baltic States Aid

92WN0462A Stockholm DAGENS NYHETER
in Swedish 31 Mar 92 p 8

[Article by Kaa Eneberg: "New Fee To Help East; Swedish Industry To Pay Environmental Expenditure in the Baltic"]

[Text] Olof Johansson wants to introduce an all-new environmental fee effective this summer in order to pay for environmental expenditures in the Baltic. The leader of the Center Party revealed on Monday that discussions were taking place within the government, in conjunction with the government's supplementary proposal, on expanded investment in the Baltic environment.

According to what DAGENS NYHETER has learned, the government is working hard on putting together an aid package for the East. About 300 million extra will be put into the supplementary budget, to be published on 24 April. The billion appropriated for fiscal year 1992/93 has already been exceeded, and in order to fulfill all of its promises and commitments, the government is additionally obliged to borrow funds from the billion kronor appropriation for the next fiscal year.

Approved the Agreement

This was done, among other things, it was stated, in order to pay back the Baltic gold handed over to the Soviet Government after the War. That gold was deposited by Lithuania and Estonia, who presumed it was in safe custody in Sweden. The loan from next year's "Eastern billion" means that aid to the East in the coming year will be less than 1 billion.

Estonia and Lithuania, according to reports, will receive their "gold," totaling 273 million kronor, in whatever form and in whatever currency they wish. If the Baltic governments prefer gold, they may buy it themselves with the Swedish money.

The Center Party leader presented his initiative on Monday at a press conference he held along with Baltic colleagues and guests for the signing of the bilateral environmental agreement between Sweden and the three countries.

As for the costs of creating a better environment in the three neighboring countries and in the Baltic, Johansson stated that the entire sum of the government's appropriated Eastern billion is virtually spoken for. Some 340 million of it goes to the bilateral cooperative effort. Consequently, fresh money is needed.

Others Engaged

Johansson declined to give details about the new environmental fee, but confirmed after the press conference that it was totally new. He also inferred that opinions in

the government diverged on the question of exacting more fees from Swedish industry.

Expected objections from Swedish industry were dismissed by the environment minister with the comment that, even from the Swedish point of view, one may regard environmental expenditure in the Baltic "as highly cost-effective investments." The revenues from the Swedish environmental fee would quite simply be put to best use on the other side of the Baltic, he felt.

At the Helsinki Commission's meeting of environment ministers, set to take place in a few weeks in Helsinki, Johansson hopes to convince Germany and Finland to engage in the same type of environmental aid. He also expressed a hope that Sweden, Germany, and Finland would act together to gain the support of the G 24 group for investment in the environment around the Baltic.

Absolute Safety

The representatives of the three Baltic states were Tonis Kaasik, Estonia's environment minister; Inuldis Emsis, chairman of the Latvian parliament's environmental committee; and Evaldas Vebra, the general director of Lithuania's environmental authority.

The joint investments discussed in Stockholm concerned, most of all, absolute safety [from contamination]. All three classed the shortage of purifying plants and clean water as a major environmental problem for the whole Baltic. One of the causes for the devastation to the groundwater was given as emissions of fuel and oil from all of the former Soviet air bases.

Paper Urges Actions To Clean Up Baltic Sea

92WN0462B Stockholm DAGENS NYHETER
in Swedish 13 Apr 92 p 2

[Editorial: "Baltic Worth a Credit; If We Wait for the Eastern States To Fix Their Environmental Problems, the Sea Will Die"]

[Text] Water unites. Across Kvarken, between Grisslehamn and Karingsund, Gotland and Estonia, Skane and Sjaelland; between Helsinki and Tallinn, Trelleborg and Travemunde. The Baltic is the concern of at least nine nations and 80 million people.

Against that background it is both odd and disturbing that the deterioration of the Baltic has been allowed to go on so long and to such an extent. No country is free of responsibility, but there is no doubt as to where the greatest problems are found. Effluence from 5 million people in the St. Petersburg area, for example, runs completely raw out into the Gulf of Finland—yesterday, today, and tomorrow. The ignorance of the Soviet state was boundless.

To properly evaluate the Baltic problem, one must recollect what this marine area looks like. The Baltic is the world's largest brackish inland sea. But it is, in a way, more of a gigantic estuary than a sea. The mean depth is

only 55 meters; in the Oresund and the Danish belt, only 25 meters. The water is chiefly characterized by what rivers and streams bring to it—the Oder, Vistula, Neva, the Swedish and Finnish streams. At long intervals, salt water from the North Sea breaks in. These infusions serve to counteract the naturally pre-existing conditions for an expanding oxygen-depleted, dead region, which is ever present in the Baltic and which has been aggravated by over-fertilization and other human influences.

It is hard, both for plants and animals, to live in the Baltic. A small number of species have adapted themselves by necessity to life in brackish water, even though their natural milieu is in fresh or salt water. It is because of this they are so sensitive to changes in the environment. They live already on the edge of their capacity. Because of the salt content, cod is often mentioned as an example of how thin the margins are. If the salt content drops below 10 parts per thousand, the eggs of the cod cannot float. And when water with this salt content in ever increasing amounts is found as oxygen-depleted bottom water, the eggs are destroyed. Cod production is inhibited.

The Baltic is thus not just any sea. Both the sea and its organisms are extremely sensitive to influences. The Baltic is unique.

When the Baltic states recently agreed to an environmental plan, it was a step forward, but like all environmental agreements it suffers from one fundamental weakness: The environment is neither better nor worse for the fact that a paper has been signed. It is concrete action which counts.

It is estimated that the environmental plan will cost close to 150 million kronor and take 20 years to complete. But who shall pay? And where should one begin?

For Sweden's part, this may prove to be quite simple. We have some easily identifiable industries who need to reduce their emissions, we could raise even further the degree of purification at our treatment plants, and we could make unconditional demands with regard to the Oresund bridge.

But the Swedish contribution will never be, from the Baltic perspective, more than marginal. It is in Russia, Poland, eastern Germany, and other Baltic states where the major portion of the problem is found.

No one can say for sure how urgent it is to halt the deterioration of the Baltic. Nevertheless, the likelihood is that every delay is dangerous.

Add to this the fact that proven technology has long been available, that the problem is well identified, and that all countries are in agreement, there remains just two small problems. The first is to get Russia and the other nations of the southwest Baltic to start working on it. The other is to obtain funding.

Yet who believe that these states are in a position to begin immediately building purification plants and refurbishing their industries?

The sad truth is that it is only through the investment of money and technology from Germany, Sweden, Finland, and Denmark, and by means of the trade and industry of

these countries, that a more comprehensive program for the survival of the Baltic could possibly be implemented swiftly. We, as a nation, can hardly avoid taking upon ourselves a substantial economic responsibility in the form of credit guarantees and other commitments, if our great inland sea is to be saved.

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